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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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Volume 12 | March 1979 No. 3

Page

General 105
(News items, letters, and editorials appearing in scientific and technical journals; information on production and use; and other items of general interest)

Monitoring and Residues 107
(levels of pesticides in people or nonexperimental animals or in water, air, soil, food, feed, and other consumer products)

Epidemiology, Prevention and Treatment 121
(Frequency and distribution of pesticide poisoning in man or nonexperimental animals and treatment of clinical cases; morbidity and mortality; safety measures; decontamination; disposal of containers and wastes; legislation and regulations)

Toxicology and Pharmacology 129
(Toxicity studies in man and animals; effects on cells; organs, and systems; metabolic studies, biochemistry, interactions; antidotes and other treatment; mode of action. Ordinarily, articles dealing with efficacy studies are not included.)

Analysis 153
(preparation of samples; analytical methods; instrumentation)

Quarterly Index, January–March
Preface 158
Subject Index
I. Concepts 159
II. Compounds 172

Author Index
Personal 191
Corporate 200

79-0501. Joy, P. J.; Josephi, K. J. (Coll. Agric., Mannuthy, Kerala, India) **The advantages, disadvantages and the possibilities of the utilization of *Brachymeric* parasites for the biological control of *Nephantis serinopa*, the black-headed caterpillar pest of coconut.** *Agric. Res. J. Kerala* 15(1): 66-68; 1977. (1 reference)

Advantages in using *Brachymeria* parasites for biological control of *Nephantis serinopa* include the easy adaptability of *Brachymeria* parasites to hot summer climates, the considerable life span of *Brachymeria* parasites which is 1 to 3 mo longer than many other parasites of *N. serinopa*, the fact that one female *Brachymeria* may attack 4 to 8 pupae in a day of oviposition, and the long ovipositor possessed by *Brachymeria* which enables it to attack even the well protected host pupa. The short time required for the parasite to develop inside the host allows a parasite population to be built up in a short time period. The lack of incidence of any natural enemies of the parasites thus far, and the fact that the host defenses such as violent wriggling, protective covering, hard cuticle, and encapsulation of the parasite, have little effect against the *Brachymeria* parasites are also advantageous for the parasites' survival. Disadvantages include the fact that only one *B. nephantidis* is obtained from a host pupa and only 4 to 8 eggs are laid by a parasite in a day. The parasites are quite inactive during sultry weather, and are incapable of distinguishing parasitized from non-parasitized pupae, also disadvantages.

79-0502. Litsinger, J. A.; Moody, K. (Int. Rice Res. Inst., Manila, Philippines) **Integrated pest management in multiple cropping systems.** *ASA Am. Soc. Agron. Publ.* 27: 293-316; 1976. (99 references)

The possibility of pesticide drift and phytotoxicity for new crop combinations and the residual effects of pesticides on non-target hosts are reviewed as they come into play in relay or sequential croppings. Use of herbicides for weed control may allow toxic residues to carry over from one crop to the next. Residues from insecticide applications to the preceding crop may linger in the soil and interact adversely with the following crop either by contamination of edible plant parts or by possible phototoxic action. Some techniques used in the science of multiple cropping include direct seeding, relay cropping, supplemental irrigation, minimum tillage, and shorter-maturing varieties of crops. All such effects are being directed toward the goal of producing more crops in the course of a year. Cropping patterns and systems must be modeled to study the complex nature of multiple cropping. The pest component is incorporated into the overall model, which can then serve in the area of pest management studies. Such models interpret cause and effect relations of modifiable variable, determine options for conflicting pest control strategies and tactics, form a basis from which to extrapolate data from one location to another, and assist the scientist in knowing where to focus research efforts. Intensive cropping technology could increase pest problems by creating a more favorable environment for pests and by increasing disturbance of the ecosystem, which can also encourage the same pest species to fluorish. Introduction of new crops to an area must be done with care to avoid the simultaneous introduction of new pests. Use of a highly suscpetible variety of a crop plant which also has a high yield may be financially disasterous as the farmer tries to protect the crop from the pests. Use of a short-maturing as opposed to a long-maturing crop will mean that the plants are exposed for a shorter period of time to pest attack. Various factors to consider in the planting of the crop for pest control achievement are discussed including crop rotation, continuous vs discontinuous planting, asynchronous vs synchronous planting, and the usefulness of seasonal changes. When considering the pest management technology which will be employed in a given case, the resources of the farmer must be considered, including money, labor, power available, land, and management capability.

79-0503. Anonymous **EPA moves toward new rules for registering pesticides.** *Chem. Eng. News* 56(47): 19-20; 1978.

The new rules proposed for registering pesticides allows for the conditional registration of pesticide products that are identical to, or substantially similar to, products currently registered. The new rules also allow the registration of new uses of existing pesticide products. New registrations cannot pose a significant incremental risk to new nontarget populations or increased exposure to populations already at risk. However, the applicant must cite all the data already in EPA's file on the product's active ingredient, even if he has developed data to support the current registration. Various company spokesmen argued that it makes no sense for a company that has developed its own data for registration to have to pay its competitors for data they had submitted to support their registration of a similar product under the compensation provision. It was feared by some that large pesticide formulators and producers might either refuse to let their data be used or ask such a high price for it that a small company would not find it worthwile to try to enter the market, thus leading to a restraint of trade in the field.

79-0504. Vouk, V. B.; Parizek, J. (Environ. Health Crit. & Stand. Unit, Div. Environ. Health, WHO, Geneva, Switzerland) **Chemicals and health.** *Interdiscip. Sci. Rev.* 3(3): 207-213; 1978. (30 references)

In a review of the complexities of our chemical environment, many aspects of human intoxication are discussed. Pathways of human exposure to chemicals include ingestion as drugs, food and food additives, and exposure to skin. The effects of environmental chemicals on health are presented for a variety of common pollutants. Mutagenic, teratogenic, and carcinogenic aspects are stressed. The authors feel that chemical pollutants may play a role in the etiopathology of some non-communicable diseases and that further research in that area is called for. Much work is still needed in the areas of exposure assessment and health-risk evaluation, and is necessary for further exploitation of the benefits of chemical progress.

79-0505. Gratz, N. G.; Hamon, J. (Div. Vector biol. & Control, WHO, Geneva, Switzerland) **Ecology and vector**

control. *Interdiscip. Sci. Rev.* 3(3): 214-219; 1978. (25 references)

A series of vector transmitted diseases (malaria, lymphatic filariasis, schistosomiasis, African trypanosomiasis, American trypanosomiasis, yellow fever, dengue hemorrhagic fever) are discussed. Discussion includes their vectors and epidemiology. The ecology and control methods of the vectors is presented. It is pointed out that an overreliance on single approaches based on massive use of pesticides has occurred. A flexible and comprehensive vector control policy will require a major effort of health education, training, information and documentation. It is hoped that the endemic countries will eventually become self-reliant with regard to vector control programs.

79-0506. Stollman, J.; Eyraud, J.; Gantz, G.; Geoga, D. (Energy Res. Co., Inc., Cambridge, MA) **Economic impact analysis of anticipated hazardous waste regulations on the industrial organic chemicals, pesticides, and explosives industries.** *Natl. Tech. Inform. Serv.* PB-279, 645: 291 p.; 1978.

The project consists of an analysis of the economic impacts of alternative regulatory levels for hazardous waste management in the industrial organic chemicals industry. The analysis consists of three segments: industry profile, price effects aanlysis, and economic impact analysis. The industry profile delineastes the products, producers, and plant characteristics in the industry. It also includes a discussion of sales trends, innovation, and industrial organization of the various industry subcategories. The price effects analysis discusses the pricing practices in the various industry segments, and includes estimates of produce price elasticity where available. The economic impact analysis delineates the impacts of two levels of regulation on the following: industry capital availability, industry entry and exit, industry structure, product prices, general inflation, GNP, foreign trade, regional economics, employment, and national energy use. (Author abstract by permission)

79-0507. Adamczyk, E. (Agric. Acad., Wroclaw, Poland) **Stan badan nad PCB (polichlorobifenylami). [Studies on PCBs (Polychlorobiphenyls). A state of the art report.]** *Postepy Nauk Roln.* 165(2): 81-100; 1978. (93 references) (Polish)

Recent studies on the environmental impact and toxicology of PCB's (which frequently occur in the environment along with DDT and the organochlorine pesticides) are reviewed. The acute oral toxicity of PCB's is fairly low; about 2 g/kg for Aroclor 1254 in male rats, and 800-1,200 mg/kg in mice. PCB's accumulate, however, in the body, especially in the fat. Twenty-four days after oral administration of a single 50 mg/kg dose of Aroclor 1254 to rats, 0.42 ppm was found in the blood, 5.83 ppm in the heart, 11.20 ppm in the kidneys, 18.85 ppm in the liver, and 672.66 ppm in the body fat. Aroclor 1254 was found to accumulate in cow's milk after oral administration. Following the oral administration of a single 100 mg/kg dose of Aroclor 1254 to pregnant cows, 0.49-5.64 ppm were found in the maternal organs, and 0.38-1.73 ppm in the fetal organs. The tolerance limits established in the USA for PCB's are 2.5 ppm in milk and milk products, 0.5 ppm in eggs, 5 ppm in fish, 0.1 ppm in baby food, and 5 ppm in food packaging materials.

79-0508. Stevens, F.; Schabas, W. (Author address not given) **Budworm fighters seek new weapons.** *Pulp Pap. Can.* 79(10): 23-26, 28, 30; 1978.

The diagnosing of 4 cases of Reye's Syndrome in New Brunswick in 1972 and 1973 led researchers to attempt to find a possible chemical origin of congenital abnormalities. Suspicions centered on the New Brunswick spraying program using fenitrothion in efforts to control budworms on forest timber. Studies were made which indicated a seasonal shift occurred in the levels of cholinesterase in school children in New Brunswick which coincided with the spraying times for fenitrothion. This enzyme is affected by organophosphorus chemicals. Various criticisms of the study program have been put forth by those who feel that fenitrothion is not the cause of the illnesses. Nova Scotia, on the other hand, has refused to allow spraying and this has led to drastic defoliation of its forests. The state of Maine has had a spray program for almost as long as New Brunswick, but has plans to remove the use of pesticides for this purpose in the near future and to depend on biological agents and management strategies by 1981.

79-0509. Backman, L.; Kolmodin-Hedman, B. (Dep. Surg., Karolinska Inst., Serafimer Hosp., Stockholm, Sweden) **Concentration of DDT and DDE in plasma and subcutaneous adipose tissue before and after intestinal bypass operation for treatment of obesity.** *Acta Chir. Scand.* 482: 35; 1978.

To test whether intestinal shunt operations were followed by increased concentrations of pesticides in adipose tissues and plasma, 8 post-operative subjects were examined. The subjects were tested for DDT, and its principle metabolite, DDE, one year prior to and one year subsequent to jejunoileostomies. Concentrations of DDE in plasma increased significantly from 5.1 ± 2.6, to 8.2 ± 3.7 ng/ml during a mean weight loss of 46.8 ± 2.8 kg, postoperatively. Mean concentrations of DDT and DDE in adipose tissue increased from 390 ± 183 to 526 ± 302 ng/g and from 863 ± 384 to 1341 ± 554 ng/g, respectively. Increased DDE:DDT ratios in all but one of the patients pointed to an increase in DDT metabolism following the bypass operation. Decreases in calculated body content of DDT and DDE significantly correlated with the initial concentration of fat in the body, but not with the rate of weight loss. The risk of DDT intoxication following intestinal bypass operations seems small, and the higher concentration of the pesticide found in the plasma and fat do not explain the unusual neurological symptoms exhibited by some of these patients.

79-0510. Walker, A. (Natl. Veg. Res. Stn., Wellesbourne, Warwick CV35 9EF, England) **Herbicide persistence - the weather and the soil.** *A.D.A.S. Agric. Dev. Advis. Serv. Q. Rev.* 27: 168-179; 1977. (24 references)

Results of various experiments designed to evaluate the persistence of herbicides in the soil are presented. In a long-term experiment, simazine was applied at 3.36 kg/ha twice a year, in early summer and in autumn, over a period of several years. After 6 yr, most of the simazine remained in the surface 5 cm of the soil, with small amounts at 15 cm. Factors which have been shown to influence the rate of degradation include the soil type, soil temperature and soil moisture content. It appears that the interrelationships of soil factors and properties make it difficult to determine their individual effects on the rates of herbicide losses. It is noted that the half-lives of all herbicides increase when the soil is dry, but also that the effects of reduced moisture on the rates of loss varied with different compounds. Rates of degradation are generally increased with an increase in temperature. Thus weather conditions, after application, would have a marked effect on persistence in the field. Soil temperature and moisture contents in the field vary considerably with the time of year. A significant factor to be considered in planting crops is the possible effect from residues of previously applied herbicides on these particular plants.

79-0511. Mordaleva, L. G.; Grechkina, V. D. (All-Union Tob. & Makhorka Res. Inst., Krasnodar, USSR) **O toksichnosti gerbitsidov treflana i devrinola v pochve. [Toxicity of the herbicides treflan and devrinol in soil.]** *Agrokhimiya* 8: 139-141; 1978. (8 references) (Russian)

The persistence and toxicity of treflan (trifluralin) and devrinol (napropamide) (1.5 kg/ha) in soil was studied by assessing their phytotoxicity for oat (treflan) and winter wheat (devrinol). Most of the treflan was retained in the upper 10-cm soil layer, and it was toxic for the plants in all soils. Treflan migrated into the 10-20-cm soil layer in chernozem only, but not in brown sandy-loam and meadow soils. Treflan retained its herbicidal activity for up to 75 days. Devrinol was not adsorbed by the soil during the first 45 days, during which period it was toxic for the plants. It migrated into the 10-20-cm soil layer only 60-75 days after application. It was degraded almost completely in 75 days in the upper 10-cm layer.

79-0512. Goga, E.; Alexandri, A. A. (Inst. Cercet. Prot. Plant., Bucharest, Romania) **Cercetari privind persistenta in vin a unor fungicide benzimidazolice. [Studies on the persistence of several benzimidazole fungicides in wine.]** *An. Inst. Cercet. Prot. Plant.* 12: 413-419; 1977. (10 references) (Rumanian)

The persistence of benzimidazole fungicides applied in vineyards was studied in wines by spectrophotometric methods. In wines pressed from benomyl-treated grapes, the benlate and methylbenzimidazole carbamate (MBC) levels were 2.0 and 5.0 ppm after 3 mo, and 0.0 and 0.92 ppm, respectively, after 12 mo. In wines pressed from thiophanate-methyl-treated grapes, the thiophanate-methyl and MBC levels found were 2.0 and 4.0 ppm, respectively, after 3 mo, and 0.2 and 0.69 ppm after 12 mo. In wines pressed from carbendazim-treated grapes, no intact carbendazine was found even after 3 mo. The MBC levels were 5.0 ppm after 3 mo 1.2 ppm after 6 mo, and 0.9 ppm after 12 mo. The findings indicate that wines pressed from grapes treated with benzimidazole fungicides should not be released for consumption for 6 mo.

79-0513. Ribas, C.; Pigati, P.; Ferreira, M. S.; Dias Netto, N. (Sec. Residuos, Inst. Biol. Sao Paulo, Sao Paulo, Brazil) **Efeito da torracao sobre residuos de lindane e endosulfan em graos de cafe. [Effect of roasting on residues of lindane and endosulfan in coffee beans.]** *Biologico* 43(9/10): 208-212; 1977. (12 references) (Portuguese)

The effect of roasting on the lindane and endosulfan residue levels in coffee beans was studied. The coffee beans analysed were harvested in a plantation treated with lindane (four times with 800 g/ha) and endosulfan (four times with 1,400 g/ha) 30 days after the last treatment. The doses used were higher and the waiting period before harvesting was shorter than normal. The lindane and endosulfan residue levels measured before roasting averaged 0.202 and 0.027 ppm, respectively. No lindane and endosulfan residues were detectable after roasting, which indicates that they were below the tolerance levels (0.001 ppm for lindane and 0.01 ppm for endosulfan).

79-0514. Wassermann, M.; Nogueira, D. P.; Cucos, S.; Mirra, A. P.; Shibata, H.; Arie, G.; Miller, H.; Wassermann,

D. (Dep. Occup. Health, Hebrew Univ., Hadassah Med. Sch., Jerusalem, Isreal.) **Organochlorine compounds in neoplastic and adjacent apparently normal gastric mucosa.** *Bull. Environ. Contam. Toxicol.* 20(4): 544-553; 1978. (8 references)

Samples of malignant tissue were studied along with apparently normal samples for the presence of organochlorine compounds. The normal tissue examined was taken from areas adjacent to the cancerous growths, in the gastric mucosa. The concentration of total DDT in the extracted lipids of the gastric carcinoma samples was higher than in those of the adjacent apparently normal gastric mucosa, 16.74 and 10.39 ppm, respectively. Total p,p'-DDT was higher (13.16 ppm) in extracted lipids of the tumoral tissues than in adjacent gastric mucosa (7.69 ppm). The level of γ-BHC and dieldrin was higher in the extracted lipids of the gastric mucosa in comparison with the epiploon and the abdominal adipose tissue. The concentration of hexachlor epoxide was lower in the extracted lipids of the tumoral tissue than in adjacent gastric mucosa, 0.11 vs 0.59 ppm, respectively. The highest levels of PCB's stored were in the extracted lipids of tumoral tissue with a significant difference between this value of 15.33 and the value of 6.29 ppm for the adjacent gastric mucosa samples.

79-0515. Rihan, T. I.; Mustafa, H. T.; Caldwell, G., Jr.; Frazier, L. (Rust Coll., Holly Springs, MS 38635) **Chlorinated pesticides and heavy metals in streams and lakes of Northern Mississippi water.** *Bull. Environ. Contam. Toxicol.* 20(4): 568-572; 1978. (4 references)

Analyses of water soluble heavy metal ions, lead and mercury, were performed on water samples collected from the North Mississippi River. Results indicated that *p,p'*-DDT and aldrin were present in fairly high concentrations, especially in the L. Tallahatchie and Yazoo Rivers. In the 10 samples taken, the range of concentrations for aldrin ran from 0.01 to 0.49 ng/l, for heptachlor from non-detectable to 0.18 ng/l; for lindane from 0.02 to 0.16 ng/l, and for *p,p'*-DDT from 2.73 to 12.31 ng/l. These levels may be due to the extensive use of pesticides in this agricultural area for the protection of cotton, soybean, and corn crops.

79-0516. Kuhr, R. J.; Tashiro, H. (Dep. Entomol., New York State Agric. Exp. Stn., Geneva, NY 14456) **Distribution and persistence of chlorpyrifos and diazinon applied to turf.** *Bull. Environ. Contam. Toxicol.* 20(5): 652-656; 1978. (2 references)

Eight experimental plots of bluegrass lawn were treated with the following formulations: chlorpyrifos 2G and 2E and diazinon 5G and 2E. Rates of application in kg AI/ha were: chlorpyrifos 2.24 and diazinon 6.72. Soil core samples were taken immediately after drainage of excess moisture off the foliage, and then at 2, 4, 7, 14, 21, 28, and 44 days after application. Diazinon residues were higher than chlorpyrifos residues in both soil and grass samples, although the levels did not always reflect the 3-fold difference in application rate. Larger residues were found on the grass with the liquid formulations than with the granular. Only a minor effect was noted from watering on chlorpyrifos distribution. Diazinon, however, appeared to move more radily from grass to soil when water was added, regardless of formulation used. More chlorpyrifos reached the soil when formulated as a granule. Dissipation rates for diazinon and chlorpyrifos from the grass were similar with half-lives of about 1 wk. Very little translocation of insecticide occurred below the 1.3 cm level.

79-0517. Miura, T.; Koyama, T.; Nakamura, I. (Dep. Hyg. Teikyo Univ. Sch. Med., Itabashi, Tokyo 173, Japan) **Mercury content in museum and recent specimens of Chiroptera in Japan.** *Bull. Environ. Contam. Toxicol.* 20(5): 696-701; 1978. (7 references)

Possible increases in mercury content of insectivorous Chiroptera were investigated by examining specimens preserved in a museum in alcohol from 1890 and comparing those results with specimens captured in 1965-1967 and 1970-1975. The Chiroptera caught in 1890 had a lower mercury content than those present in the later specimens. This difference was thought to be due to the use of mercurial pesticides which did not occur prior to 1890. When the study was performed using bats as the test species, mercury content in the bats during and after dusting periods were almost the same.

79-0518. Seifert, J.; Blattny, C.; Henzlerova, H.; Davidek, J. (Dep. Food Chem. & Anal., Prague Inst. Chem. Technol., CS-16628 Prague 6, Czechoslovakia.) **Persistence of fungicide Euparen on strawberry and/or in some canned products of strawberry.** *Bull. Environ. Contam. Toxicol.* 20(5): 702-706; 1978. (6 references)

Strawberries were treated with a 0.2% solution of Euparen (dichlofluanid, Bayer AG) at 2,200 l/ha. The first spraying was done 10 days after the bloom of the plants, the second and third sprayings were carried out after 10 and 29 days, respectively. The decay of dichlofluanid on strawberry leaves proceeds according to the first-order kinetics in the initial 21 days. The content of dichlofluanid residue on the leaves of strawberries treated with two sprays of fungicide decreased to 2 ppm after 35 days. At the 55th day after the first spray, the residue level was still around 1.5 ppm. The major product of degradation in the leaves was *N,N*-dimethyl benzensulfonamide. The highest content of dichlofluanid residues in canned strawberry was 0.5 ppm. While two sprayings did not cause any changes in the taste or flavor of the fruits, three sprayings caused a sulfur off-flavor the first day after the third treatment, and even though at 4 days after the treatment the off-flavor had disappeared, the characteristic strawberry odor had not returned.

79-0519. Brevik, E. M.; Bjerk, J. E.; Kveseth, N. J. (Vet. Coll. Norway, Dep. Pharmacol. & Toxicol., Oslo, Norway) **Organochlorines in codfish from harbours along the Norwegian coast.** *Bull. Environ. Contam. Toxicol.* 20(5): 715-720; 1978. (8 references)

Measurements of the levels of PCB's, HCB (hexa-

chlorobenzene) and total DDT made from codfish samples collected near the harbors of several towns located along the coast of Norway indicate that the contamination from these chemicals is in general low. The total DDT in cod liver collected from the Bergen area (14.5 ppm) was significantly above levels found at other sampling sites. Similarly the Oslo fjord area of Drobak (1.0 ppm) had a significantly higher level than did Oslo and Fredrikstad. Highest levels of HCB residues were found near the Oslo fjord area, which coincides with the area of highest manufacture of several chemicals and metals. The highest level was found in codfish liver from Kristiansand, followed by Fredrikstad, Drobak and Oslo. Kristiansand has a considerable metallurgic industry and is the largest town in the southern part of Norway. The HCB concentration at this point was 2.3 ppm.

79-0520. Radosevich, S. R.; Winterlin, W. L. (Dep. Bot., Univ. California, Davis, CA) **Persistence of 2,4-D and 2,5,6-T [sic] in chaparral.** *Calif. Agric.* 32(10): 14-15; 1978.

The distribution, persistence, and vertical movement in the soil of 2,4-D and 2,4,5-T after application to chaparral areas was studied. Samples of the terminal 10 to 15 cm of chamise foliage, understory grass and forbs, soil surface litter, and soil up to 5 cm deep were collected before, immediately after, and at 30, 60, 90, 180, and 360 days after the herbicides were applied. Soil samples were also taken at 10 to 15, 25 to 30, and 55 to 60 cm depths. A vertical pattern of herbicide distribution was noted. The soil surface litter was the major receptor of both herbicides. Herbicide residues on foliage and litter decreased up to 93% within 30 days. The rate then slowed with residues of 0.01 to 0.03% being recorded after 360 days. Immediately after application residues of 2,4-D (0.1%) and 2,4,5-T (0.07%) were present in the soil to a much lesser degree than the residues in surface litter or vegetation. The rapid initial loss of herbicides may be due either to volatilization or photochemical degradation.

79-0521. Cerna, V.; Benes, V.; Korak, E. (Inst. Hyg. Epidemiol., CS-10042 Prague, Czechoslovakia) **Dynamika rezidui pirimiphos-methylu v plodinach. II. Rezidua po aplikaci na skladovane obili. [Residue dynamics of pryrimiphos-methyl in produce. II. Residues after application on stored grain.]** *Cesk. Hyg.* 23(8): 321-325; 1978. (12 references) (Czech)

The residue dynamics of pyrimiphos-methyl (PM) in wheat grains stored in a silo was studied after the application of a dose of 4 mg/kg (active agent). The residue level was 3.70 mg/kg on the day of application, 4.51 mg/kg after 105 days' storage, and 1.62 mg/kg after 286 days. After milling, most of the residue remained in the bran and pollard flour (about 80%), and only about 20% (0.29 mg/kg versus 0.525 mg/kg) in the white flour. Bread baked from such flour contained 0.27 mg/kg of PM.

79-0522. Hague, A.; Schuphan, I.; Ebing, W. (Inst. Pflanzenschutzmittelforsch. Biol. Bundesanst., Berlin, BRD) **On the metabolism of phenylurea- herbicides. X. Movement and behaviour of a glucose conjugate in plant and soil.** *Chemosphere* 7(8): 675-680; 1978. (11 references)

The fate of the glucoside conjugate of the pesticide monolinuron was investigated in both plant and soil short term studies. 3-(4-Chlorophenyl-^{14}C)- 1-methoxy- 1-hydroxymethyl- urea-β-glucoside was synthesized from ^{14}C-hydroxymonolinuron and applied to 8 wk old spinach plants. The glucoside was applied as droplets to leaf surface injected into the stem and given in nutrient solution through the roots. Very small amounts of glucoside were transported out of the site of leaf application; 94.5% of the glucoside remained at the point of application after 7 days. Root application and injection into the stem showed movement away from the site of application. Very little radioactivity accumulated in the growing shoots and was mostly localized in the leaf margins. Of the glucoside applied to the roots, 60-70% was metabolized within 7 days. Time sequence study of hydroxy monolinuron- β-glucoside uptake and metabolism in 11 day old maize plants showed that within 5 days up to 84% of the radioactivity was absorbed by the plants through the cut end of the stem.

79-0523. Mes. J.; Davies, D. J. (Dep. Natl. Health & Welfare, Health Prot. Branch, Food Dir., Tunney's Pasture, Ottawa, Ont., Canada) **Variation in the polychlorinated biphenyl and organochlorine pesticide residues during human breast-feeding and its diurnal pattern.** *Chemosphere* 7(9): 699-706; 1978. (12 references)

Milk from the right breasts of two donors, collected at different stages of lactation and during various times of the day, was analyzed for pesticide contaminants. Milk of donor I was collected 4 times during the morning (M) and evening (E) and 5 times during mid-day (MD) feeding on the 126th day of lactation. Female II contributed 6 M and MD, and 4 E samples on the 177th day. Each sample was analyzed for PCB and organochlorine (OC) pesticides via gas chromatography. The fat content of donor I's milk reached its peak during MD, as expected; for donor II the fat content was highest during E feeding. The amounts of pesticides in the milk did not correlate linearly with increased fat content, but fluctuated at different times of the day. Actual amounts of *p,p'*-DDT dropped during the day in donor I's milk, but increased considerably in donor II. The total possible pesticide intake was 7.88 μg for baby I, and 3.36 μg for infant II. The infants' daily intake of PCB's, dieldrin, and total DDT was estimated at 0.6, 0.04, and 1.8 μg/kg for donor I, and 0.3, 0.03, and 0.5 μg/kg for donor II, respectively.

79-0524. Bergon, M.; Calmon, J.-P. (Lab. Chim. Org. Biol. Sol, Ecol. Natl. Agron., Inst. Natl. Polytech. Toulouse, F-31076 Toulouse Cedex, France) **Schema de degradation em milieu alcalin d'un carbamate herbicide, le N-phenylcarbamate d'isopropyle (propham). [Decomposition mechanism of a carbamate herbicide, *N*-isopropyl phenylcarbamate (propham) in an alkaline medium.]** *C. R. Acad. Sci. Ser. C* 286(25): 709-712; 1978. (13 references) (French)

The mechanism of alkaline hydrolysis of propham (isoproyl-*N*- phenylcarbamate), used as an antigerminative in potato storage, was studied by determining the rate constants of its hydrolysis by UV spectrophotometry at 50°C with 0.01 to 3 *N* concentrations of Na_2CO_3 and comparing them with rate constants obtained with a related compound, *N*-methyl propham which leads to hydrolytic products following a bimolecular process. The study indicates that alkaline hydrolysis of propham results in *N*-phenylcarbamic acid with probable competition between the elimination-addition and addition-elimination mechanism in view of the fact that interaction with 12% caustic soda solution results in the formation of isocyanate, a toxic substance. While in the soil, carbamate herbicides are metabolized by a rupture of the carbamate link and the formation of aniline, CO_2 and alcohol. In plants propham hydroxylation in positions 2 and 4 of the aromatic ring and the aliphatic chain is the principal metabolic reaction.

79-0525. Strekozov, B. P.; Chubenko, A. P.; Sokolov, M. S. (Inst. Agrochem. & Soil Sci., USSR Acad. Sci., Pushchino, USSR) **Migratsiya i raspredelenie ostatkov propanida v donnykh osadkakh priazovskikh limanov. [Migration and distribution of propanil residues in the bottom sediments of the Azov Sea region.]** *Izv. Akad. Nauk SSSR Ser. Biol.* (6): 930-933; 1977. (13 references) (Russian)

The migration and distribution of propanil and its metabolite 3,4-dichloroaniline were studied in the water and benthic sediments in the first system of the Sea of Azov. Propanil is used in the Sea of Azov region as a pesticide on rice fields. Propanil was found to be transported to the first system partly in the form of true solution and partly adsorbed on colloids. The propanil plus 3,4-dichloroaniline concentrations ranged from 0 to 8.1 μg/l in the water, and from 0 to 333 μg/kg in the benthic sediments. The concentrations in the water were highest in the spring, following the massive use of propanil on the rice fields, and in the early fall, after the water was drained from the rice field. The residues were not degraded completely during the fall and winter period, which indicates a gradual accumulation in the estuary and delta zones.

79-0526. Bollag, J.-M.; Blattmann, P.; Laanio, T. (Dep. Agron., Pennsylvania State Univ., University Park, PA 16802) **Adsorption and transformation of four substituted anilines in soil.** *J. Agric. Food Chem.* 26(6): 1302-1306; 1978. (12 references)

^{14}C-labeled substituted anilines were added to soil, and their adsorption and transformation were followed by trapping of volatile products and analysis of the residual radioactivity. If autoclaved and nonautoclaved soils were treated with anilines and incubated for 6 wk, no CO_2 evolution could be determined from autoclaved soil, but in the nonautoclaved samples CO_2 could be detected in an amount of 7.5, 20.0, 7.6, and 8.4% of the originally applied radioactivity for 4-chloroaniline, 4-chloro-*o*-toluidine, 4-isopropylaniline, and 2,6-dimethylaniline, respectively. Binding to soil varied between 34 and 66% after 24 hr of incubation for variously substituted anilines, but after 6 wk incubation the range of binding between the anilines varied only slightly. However, TLC analysis of the methanolic Soxhlet extract and subsequent extraction by the Bleidner method indicated the formation of different transformation products. Acylation appears to occur easily in soil, as was shown by the isolation and identification of 4-isopropylformanilide and *N*-acetyl-2,6-dimethylanilide from the corresponding anilines. (Author abstract reprinted by permission of the American Chemical Society)

79-0527. Biggar, J. W.; Mingelgrin, V.; Cheung, M. W. (CIBA-GEIGY Corp., Greensboro, NC 27409) **Equilibrium and kinetics of adsorption of picloram and parathion with soils.** *J. Agric. Food Chem.* 26(6): 1306-1312; 1978. (21 references)

The kinetics of adsorption of pesticides on soils is examined utilizing a flow-type system. The pesticide-soil systems included picloram and parathion reacting with Palouse silt loam and Panoche clay loam. Values of the relative adsorption constant, k*o*, which is independent of the initial solution concentration, flow rate, and soil mass at 25°C were 0.644, 0.441, 0.546, and 0.359 for the reactions picloram with Palouse silt, parathion and Panoche clay, parathion with Palouse silt, and picloram with Palouse silt acidified to pH 3, respectively. From the temperature dependence of k*o*, the activation energies, E*a*, were 2.7, 1.3, and 4.3 kcal/mol for the first three systems. Mechanisms of interaction based on experimental results and thermodynamic considerations emphasize the importance of organic matter for picloram adsorption and both clay and organic matter in the adsorption of parathion. Properties of the pesticides and the soil components were considered in proposing the mechanisms. (Author abstract reprinted by permission of the American Chemical Society)

79-0528. Woodrow, J. E.; Crosby, D. G.; Mast, T.; Moilanen, K. W.; Seiber, J. N.* (Dep. Environ. Toxicol., Univ. California, Davis, CA 95616) **Rates of transformation of trifluralin and parathion vapors in air.** *J. Agric. Food Chem.* 26(6): 1312-1316; 1978. (16 references)

The herbicide trifluralin (α,α,α-trifluoro- 2,6-dinitro- *N,N*-dipropyl-*p*-toluidine) and the insecticide parathion (*O,O*-diethyl *O*-*p*-nitrophenyl phosphorothioate) were released separately to the atmosphere as emulsifiable concentrate sprays. Their vapors were sampled downwind by high-volume air samplers filled with XAD-4 macroreticular resin as the trapping medium. Analysis of the air samples indicated rapid photochemical conversion of trifluralin vapor to a dealkylated product (2,6-dinitro-*N*-propyl- α,α,α-trifluoro- *p*-toluidine) and parathion vapor to paraoxon (*O,O*-diethyl *O*-*p*-nitrophenyl phosphate). Half-lives for conversion were estimated as 20 min and 2 min for trifluralin and parathion, respectively, under comparable midday summer sunlight conditions. The half-life for trifuralin conversion increased to 193 min when the season changed from summer

to fall. Trifluralin was stable in the dark; however, parathion showed some conversion to paraoxon on a summer night (131-min half-life). Results from laboratory experiments conducted under simulated sunlight conditions were consistent with the field results. Rates of photochemical conversion in the laboratory were significantly increased when 1-3 ppm ozone was added to the reaction flask. (Author abstract reprinted by permission of the American Chemical Society)

79-0529. Parlar, H.; Mansour, M.; Baumann, R. (Inst. Oekol. Chem., Ges. Strahlen. & Umweltforsch., D-8051 Munich, BDR) **Photoreaction of hydroxychlordene in solution, as solids, and on the surface of leaves.** *J. Agric. Food Chem.* 26(6): 1321-1324; 1978. (10 references)

The photoreactions of the heptachlor transformation product 1-*exo*-hydroxychlordene (*exo*-4,5,6,7,8,8- hexachloro-3a,4,7,7a- tetrahydro-4,7-methanoinden-1-ol) dissolved in organic solvents, as a solid on glass, and dispersed on plant leaf surfaces have been investigated. In addition, to the (2 + 2) cycloaddition typical for this substance class, an entirely novel intramolecular photoisomerization reaction was found. This reaction leads to cyclic ketone, 1,1a,2,2,3, *exo*-6- hexachloro- 1a,2,3,3a,5a,5b-hexahydro- 1,3-methano-1*H*-cyclobuta[*cd*]pentalen-4-one, whose structure was established by spectral data obtained by mass spectrometry, infrared spectrometry, and ^{1}H and ^{13}C nuclear magnetic resonance measurements. (Author asbtract reprinted by permission of the American Chemical Society)

79-0530. Wauchope, R. D. (South. Weed Sci. Lab., SEA, Fed. Res., USDA, Stoneville, MS 38776) **The pesticide content of surface water draining from agricultural fields-a review.** *J. Environ. Qual.* 7(4): 459-472; 1978. (69 references)

The literature on pesticide losses in runoff waters from agricultural fields is reviewed. For the majority of commercial pesticides, total losses are 0.5% or less of the amounts applied, unless severe rainfall conditions occur within 1-2 wk after application. Exceptions are the organochlorine insecticides, which may lose about 1% regardless of weather pattern because of their long persistence, and soil surface applied, wettable-powder formulations of herbicides, which may lose up to 5%, depending on weather and slope, because of the ease of washoff of the powder. Pesticides with solubilities of 10 ppm or higher are lost mainly in the water phase of runoff, and erosion control practices will have little effect on such losses. Organochlorine pesticides, paraquat, and arsenical pesticides, however, are important cases of pesticides which are strongly adsorbed by sediments, and erosion control can be important in controlling losses of these compounds. The behavior and fate of pesticides in streams receiving runoff is generally not known. Information on such factors as time and distance of impact of a given runoff event, ability of local ecosystems to recover from transient pesticide concentrations, and dissipation or concentration processes in aquatic ecosystems will have to be obtained before "edge-of-field" pesticide losses can be related to water quality in receiving waters. (Author abstract by permission)

79-0531. Anderson, L. W. J.; Pringle, J. C.; Raines, R. W.; Sisneros, D. A. (Aquat. Weed Control Lab.) **Simazine residue levels in irrigation water after ditchbank application for weed control.** *J. Environ. Qual.* 7(4): 574-579; 1978. (20 references)

A field study was conducted to determine the amount of simazine [2-chloro-4,6-bis(ethylamino)-*s*-triazine] likely to be found in irrigation water after ditchbank treatment for weed control. Resulting data are useful in evaluating the potential impact of simazine on crops irrigated from sprayed canals. Canals were selected in California, Colorado, and Washington for the application of simazine to both watered and dewatered sites at rates of 2.25 to 7.43 kg/ha. Simazine levels in flowing canal water immediately after herbicide application did not exceed 60 μg/l. In first-flow samples collected in the spring from the sites that were dewatered at application, simazine levels peaked at about 250 μg/l within the treated section but decreased rapidly to < 5 μg/l. (Author abstract by permission)

79-0532. Hebb, E. A.; Wheeler, W. B. (Southeast For. Exp. Stn., USDA For. Serv., Marianna, FL 32446) **Bromacil in Lakeland soil ground water.** *J. Environ. Qual.* 7(4): 598-601; 1978. (21 references)

The objective of this study was to evaluate the probable magnitude of the problem of the leaching of pesticides into ground water under extreme conditions: a sandy soil low in organic matter, a persistent and mobile herbicide applied at a high rate, plentiful rainfall, and a water table within 6 m. Bromacil (5-bromo-3-*sec*-butyl- 6-methyluracil) was applied at the rate of 22 kg/ha to a Lakeland sand bearing scrub vegetation of small oaks and poor grasses. Ground water (at depths ranging from 4.5 to 6 m) was sampled from bromacil residue at weekly intervals for 2 yr. Residue was first found in the ground water 3 mo after application and was highest (1.25 ppm) 1 mo later. Thereafter the amount declined to < 0.1 ppm in about a yr and < 0.001 ppm in 2 yr. Peaks in residues generally followed periods of increased rainfall by about 2 wk. Residues (0.24 ppm) were still detected in the surface soil 2 yr after application. (Author abstract by permission)

79-0533. Turner, C. E. ; Elsohly, M. A.; Cheng, F. P.; Torres, L. M. (Res. Inst. Pharm. Sci., Univ. Mississippi Sch. Pharm., University, MS) **Marijuana and paraquat.** *J. Am. Med. Assoc.* 240(17): 1857; 1978. (4 references)

Confiscated Mexican cannabis was screened for paraquat quantitatively using the procedure recommended by Chevron Chemical Co, Ortho Division, with which paraquat can be detected at levels as low as 1 ppm. Thirteen of the 100 samples taken contained paraquat. In 1976 four samples were taken and all were positive. In 1977, 46 samples were taken with 9 testing positive. It was estimated that, after October 20, 1976, the possibility of a Mexican-grown marijuana sample containing 1 ppm or more of paraquat was 13 out of 61. However, it cannot be said that current street marijuana will be positive for paraquat 21.31% of the time. In diagnosing

any health related problems suspected to be caused by marijuana containing paraquat, the health examiner cannot depend on analysis of paraquat by commercial labs. It also is noted that marijuana smoke itself is comparable with tobacco smoke in that they both contain cancer causing chemicals.

79-0534. Vasil'eva, G. K.; Vsevolozhskaya, N. B.; Petro, N. P. (Inst. Agrochem. & Soil Sci., USSR Acad. Sci., Pushchino, USSR) **Osobennosti povedeniya meturina i fenilmetilmocheviny na posadkakh kartofelya. [Behavior of methurine and phenylmethylurea in potato fields.]** *Khim. Sel'sk. Khoz.* 15(5): 65-68; 1978. (14 references) (Russian)

The effectiveness, degradation and migration of methurine (4 kg/ha) and phenylmethylurea (PMM; 3.6 kg/ha) were studied in potato fields following postemergence treatment in May. The soil was alluvial meadow soil with 3.8% humus. Methurine was transformed practically completely into PMM within the first few days after application. A small portion of the PMM metabolised into aniline. Most of the PMM was found in the upper 5-cm soil layer. No residues were found in the soil 130 days after treatment. At harvest, no residues were found in the potato tubers.

79-0535. Sukhoparova, V. P.; Ryzhaya, M. A. (Inst. Agrochem. & Soil Sci., USSR Acad. Sci., Pushchino, USSR) **Razlozhenie linurona v pochve i rasteniyakh l'na. [Degradation of linuron in soil and flax plants.]** *Khim. Sel'sk. Khoz.* 15(5): 68-72; 1978. (17 references) (Russian)

The migration and decomposition of linuron in soil and flax plants was studied in field experiments. Linuron was applied on the soil at rates of 0.3-0.5 kg/ha. The upper 0-1.25-cm soil layer was found to contain 60-100% of the linuron applied; only negligible residues were found in the 2.5-5-cm soil layer 1 mo after application. The rate of degradation of linuron in the soil was enhanced by high temperature and precipitation; the half-life was 16 days in a month with a mean temperature of 9.7°C, and 12 days in another month with a mean temperature of 15°C. Complete degradation was seen during the vegetation period. The amount taken up by the flax plants was negligible, but 3,4-dichloroaniline residues of 150-200 μg/kg were found in the seeds. The findings indicate the fairly high persistence of the metabolite 3,4-dichloroaniline.

79-0536. Ulasevich, E. I.; Kharchenko, S. M.; Veselovs'kii, I. V.; Skuryatin, M. O. (Ukr. Agron. Acad., Kiev, USSR) **Vpliv riznikh doz metakhloru na mikrofloru glibokogo malogumusnogo chornozemu. [Effect of various metachlor doses on microflora of deep low-humus chernozem soils.]** *Mikrobiol. Zh. (Kiev)* 39(1): 88-92; 1977. (13 references) (Ukrainian)

The effect of metachlor (2.6 and 4.1 kg/ha) on soil microorganisms was studied in moderately loamy low-humus soils in pot and field tests. Metachlor had caused no change in the overall soil bacteria count during the first 15-30 days after application, but it reduced the bacteria count by 1.6-2.5 times in the middle of the vegetation period. There was a slight increase in the sporulating bacteria count throughout the observation period. Metachlor also stimulated the growth of oligonitrophilic bacteria throughout the vegetation period. After an initial inhibition, it stimulated the growth of Actinomycetes. In the lower dose, metachlor stimulated the growth of nodules on soybean plants; the higher dose exerted a similar stimulating effect only during the second half of the vegetation period.

79-0537. Bristol, D. (Residue Res. Lab., Dep. Biochem., North Dakota State Univ., Fargo, ND 58102) **Effects of storage conditions on residues of 2,4-D and 2,4-DCP in potatoes.** *Natl. Bur. Stand. (U.S.) Spec. Publ.* 422: 737-745; 1976. (6 references)

Potato tuber samples were collected from plants which had been treated with 0, 60, and 120 g active ingredient of 2,4-D at 42 and 28 days prior to harvest. Potatoes receiving 60 g active ingredient per acre contained 0.068 to 0.15 ppm 2,4-D residue. Potatoes treated with similar quantities of 2,4-DCP contained residues in the amount of 0.002 to 0.012 ppm. Conjugated residues of 2,4-D were not found in significant quantities. The manner in which the field samples were processed and the temperature under which they were stored both affected the stabilities of 2,4-D and 2,4-DCP residues in the stored samples. At 4°C, the residue levels of metabolically incorporated 2,4-D decreased over a 15 mo period, but, under the same conditions, no decrease was noted in 2,4-DCP residues. In samples which were washed, sliced, fortified and processed for freezing, recoveries of 2,4-D were constant over a 15-mo period, while recoveries of 2,4-DCP decreased slowly from 88 to 47%.

79-0538. Archer, S. R.; McCurley, W. R.; Rawlings, G. D. (Monsanto Res. Corp., Dayton, OH 45407) **Source assessment: pesticide manufacturing air emissions-overview and prioritization.** *Natl. Tech. Inform. Serv.* PB 279,171: 153p.; 1978. (29 references)

The report is an overview of the pesticide manufacturing industry and prioritizes 80 major pesticides based on their potential environmental burden from an air pollution standpoint. Production of synthetic organic pesticides was about 640,000 metric tons in 1974. Thirty-seven major synthetic organic pesticides, those with annual production of 4540 or more tons, accounted for 74% of the market. Elemental chlorine is common to most pesticides, but other raw materials include hydrogen cyanide, carbon disulfide, phosgene, phosphorus pentasulfide, hexachlorocyclopentadiene, various amines, and concentrated acids and caustics. Air pollution aspects of the pesticide manufacturing industry are essentially without quantitative data. For some plants, the pollution caused by loss of active ingredients is less significant than that caused by unreacted by-products. Evaporation from holding ponds and evaporation lagoons may also be an emission source, although few quantitative data are available. Emissions emanate from various pieces of equipment and en-

ter the atmosphere as both the active ingredient and as raw materials, intermediates, and by-products. Air emission control devices include baghouses, cyclone separators, electrostatic precipitators, incinerators, and gas scrubbers. Synthetic organic pesticide production in 1985 will be about 806,000 metric tons. (Author abstract by permission)

79-0539. Kitamura, M. ; Sumino, K.; Mitsuo, T. (Sch. Public Health, Fac. Med., Kobe Univ., Kobe, Hyogo, Japan) **[Search for organochlorine pesticide residues in human bodies by mass spectrometry.]** *Nippon Koshu Eisei Zasshi (Jpn. J. Public Health)* 25(10): 284; 1978. (1 reference) (Japanese)

About 100 g each of human fat and liver was separately extracted with 1 *N*- hydrochloric acid:acetonitrile solution. After emulsification, the acetonitrile layer was fractionated by silica gel column chromatography. The hexane-soluble fraction was hydrolyzed and chromatographed with benzene. The benzene-soluble fraction was separated by ECD-gas chromatography or by TIM-gas chromatography. Each fraction was further separated by mass spectrometry. Analysis of the mass spectrogram showed the presence of hexachlorobenzene, β-BHC, trichlorobiphenyl, *p,p'*-DDE, and a compound presumably identified as a dehydrogenated cyclic diene of chlordane. The total amounts of these residues comprised about one tenth of the fat in the liver. [At the 37th Annu. Mtg. of the Japanese Soc. of Public Health.]

79-0540. Shimamoto, T.; Matsuda, H.; Watabe, M.; Mori, K.; Yamatake, S.; Soda, K. (Inst. Hyg. Ehime Prefect., Matsuyama, Ehime, Japan) **[The change of the concentration of organochlorine compounds in human fat in time.]** *Nippon Koshu Eisei Zasshi (Jpn. J. Public Health)* 25(10): 285; 1978. (Japanese)

Data on the concentration of organochlorine pesticide residues in human omental fat obtained in 1974 from inhabitants of Ehime Prefecture were compared with data obtained on 35 adipose specimens in 1976 to study the changes over the three year period. Alpha-BHC residues in 1974 were found to average 0.08 ppm as compared to 0.12 ppm in 1976. Beta-BHC residues in 1974 were 11.15 ppm while in 1976 they averaged only 4.73 ppm. The γ- and δ -BHC isomers averaged 0.01 and 0.02 ppm in 1974, but in 1976 no residues of these pesticides were detected in the adipose specimens examined. In 1974, the total BHC fat content averaged 11.26 ppm. In 1976 total BHC fat residues decreased to an average of 4.88 ppm. DDT, DDE, and TDE fat levels averaged 1.42, 6.08, and 0.04 ppm, respectively, in 1974, while the 1976 average residues of these compounds were 0.84, 3.59, and 0.02 ppm, respectively. The average residue level for total DDT in fat in 1974 was 7.49 ppm as compared to an average concentration of 4.46 ppm in fat specimens from 1976. These results indicate a decrease in the adipose concentrations of total BHC and of total DDT of 57 and 41%, respectively during the three year period studied in this experiment. [At the 37th Annu. Mtg. of the Japanese Soc. of Public Health]

79-0541. Ando, M.; Wakisaka, I. (Dep. Environ. Sanit. Natl. Inst. for Environ. Pollut. Res., Tsukuba, Ibaragi, Japan) **[Effects of dietary factors on the amount of organochlorine compounds in living bodies.]** *Nippon Kooshu Eisei Zasshi (Jpn. J. Public Health)* 25(10): 286; 1978. (2 references) (Japanese)

To study the effects of dietary protein and fat on the residual concentration of DDT in the living organism, purified *p,p'*-DDT was administered ip at a level of 7.18 mg/kg (in olive oil) to male Wistar rats in 25 groups on diets of a combination of protein (5, 10, 20, 30 and 40%) and fat (0.5, 2.5, 5, 10, and 20%) for 2 wk. Rats were killed after 22 days of DDT administration and total body weights, weights of organs, volumes of blood corpuscles, and residual amounts of DDT in organs were examined. The results showed that the most effective content of protein in the diet for rat growth was about 20%. The contents of protein and fat in the diet significantly affected the residual amount of DDT found in rat liver with $P < 0.005$. The mutual effect of dietary contents of fat and protein also affected significantly the amount of DDT in the liver with $P < 0.01$. [At the 37th Annu. Mtg. of the Japanese Soc. of Public Health]

79-0542. Takano, A.; Ando, T.; Nakano, A.; Wakisaka, I. (Sch. Public Health, Fac. Med., Kagoshima Univ., Kagoshima, Japan) **[The distribution of mercury and total DDT in fishes caught in Kagoshima Bay.]** *Nippon Kooshu Eisei Zasshi (Jpn. J. Public Health)* 25(10): 305; 1978. (Japanese)

The contents of total mercury, methylmercury and total DDT in fish caught in Kagoshima Bay in February (*Cantherines modestus, Pagrosmus major, Sebastiscus marmoratus,* and *Parapristipoma trilineatum*) and in June (*Konosirus punctatus, Mugil cephalus, Siganus fuscescens, Dasybatus akajei*) of 1977 were determined. The content of total DDT in muscles of the fish was on the average of 13.5 ppm in *Cantherines modestus,* 211.3 ppb in *Pagrosmus major,* 143.3 ppb in *Sebasticus marmoratus,* and 324.0 ppb in *Parapristipoma trilineatum* caught in February. The average total DDT content in muscle of fish caught in June was 25.7 ppb in *Konosirus punctatus,* 6.3 ppb in *Mugil cephalus,* and 10.4 ppb in a fish called *Kurosagi* in Japan. A significant correlation was found between the contents of total mercury and DDT in muscles of *Mugil cephalus,* and between the body weight and the DDT content in muscles of *Konosirus punctatus* and *Kurosagi.* The differences in the route of pollution and of condensation of mercury and total DDT in Kagoshima Bay are also considered. [At the 37th Annu. Mtg. of the Japanese Soc. of Public Health]

79-0543. Kawanishi, A.; Asanuma, N.; Suzuki, A. (Japan Inst. Rural Med., Usuda, Nagano, Japan) **[Studies on the organochlorine pesticide residues in human bodies part 9.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 610-611; 1978. (Japanese)

Determinations of organochlorine pesticide residues in 72 specimens (25 male and 47 females) of various tissue taken in 1978 were reported and compared with similar data

from 1973 to 1978. For BHC, the α-, β-, and γ-isomers appeared with frequencies of 94.4, 97.2, and 81.9%, respectively. Total BHC in 1978 appeared with a frequency of 98.6%. In 1978 *p,p'*-DDT, *o,p'*-DDT, *p,p'*-DDD(TDE), and *p,p'*-DDE appeared with frequencies of 95.8, 84.7, 5.6, and 100.0%, respectively, with total DDT having a frequency of 100.0%. The ranges of values in the specimens tested in 1978 were non-detectable (nd) to 0.546 ppm (ave. 0.145) for α-BHC, nd to 53.918 ppm (ave. 4.815) for β-BHC, nd to 0.112 ppm (ave. 0.016) for γ-BHC, nd to 54.118 ppm (ave. 4.976) for total BHC, nd to 18.916 ppm (ave. 1.856) for *p,p'*-DDT, nd to 2.027 ppm (ave. 0.170) for *o,p'*-DDT, nd to 5.727 ppm (ave. 0.163) for *p,p'*-DDD, 0.051 to 53.998 ppm (ave. 7.627) for *p,p'*-DDE, and 0.247 to 57.370 ppm (ave. 9.816) for total DDT. From these data it was shown that organochlorine residues are still present in human bodies after 8 yr from the start of the ban on DDT and BHC. When the specimens were classified etiologically, it was found that the cancers of the digestive organs contained higher levels of every residue than specimens from other disease causes. The results of determinations from 1973 to 1978 showed that for 350 specimens, the average value of organochlorine pesticide residues was 3.311 ± 4.159 ppm for total BHC, 9.288 ± 9.760 ppm for total DDT, and 0.163 ± 0.163 ppm for dieldrin. The values were higher in men and in older persons at a statistically significant level. The tendency of higher organochlorine levels in specimens from digestive cancers was also observed in the analysis of the 1973-1978 data. [At the 27th Annu. Mtg. of the Japanese Soc. of Rural Med.]

79-0544. Sasaki, S.; Watabe, K.; Endo, H.; Hayashi, S.; Sugaya, H. (Inst. Rural Med., Hiraga Gen. Hosp., Hirago, Aomori, Japan) **[On the organochlorine pesticide residues and the residue of PCB in human bodies (report of 1977).]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 612-613; 1978. (Japanese)

Results of determinations of organochlorine pesticide residues in 24 specimens of mothers' milk, 38 specimens of adipose tissue, 21 specimens of liver, 18 specimens of kidney, and 17 specimens of spleen were reported for specimens collected from April, 1977 to March, 1978. The highest values of β-BHC, *p,p'*-DDE, *p,p'*-DDT, and dieldrin were 0.125, 0.122, 0.033 and 0.0013 ppm, respectively. The lowest values for these compounds in the same order were 0.003, 0.016, 0.003 and 0.0001 ppm, respectively with averages of 0.045, 0.053, 0.014 and 0.0001 ppm, respectively in mother's milk. In liver specimens the residues for β-BHC, *p,p'*-DDE, *p,p'*-DDT, and dieldrin had maximums of 6.774, 15.364, 3.382, and 0.184 ppm; minimum levels of 0.736, 0.294, 0.157, and 0.0 ppm and averages of 2.672, 4.390, 0.824, and 0.033 ppm, respectively, as measured in fat. Organochlorine pesticide residues were detected in all specimens. In mother's milk and in adipose tissue a tendency of reduction of β-BHC residues was found; however, *p,p'*-DDE and *p,p'*-DDT show a plateau. Organ residues were highest in the liver, followed by the kidney, and then by the spleen. The residues of PCB found were nearly the same as the country-wide average determined in 1973. [At the 27th Annu. Mtg. of the Japanese Soc. of Rural Med.]

79-0545. Takamiya, T.; Uchida, A. (Inst. Rural Med., Fac. Med., Chiba Univ., Chiba, Japan) **[Residues of organochlorine pesticides in foods.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 614-615; 1978. (Japanese)

Residues of organochlorine pesticides *p,p'*-DDT, *p,p'*-DDE, *o,p'*-DDT, *p,p'*-DDD (TDE), dieldrin, α-, β-, and γ-BHC, and heptachlor epoxide were determined in samples of fish meat (tunny, saurel and yellowtail), cooked lard, raw lard, butter, and margarine. The results showed that levels of these residues were the highest in yellowtail with ranges of 16-83 ppb, 23-39 ppb, 6.2-18 ppb, 13-20 ppb, 4-14 ppb, 2.2-11.5 ppb, N.D.- 15 ppb. N.D.-1.3 ppb, and N.D. for the above mentioned compounds in the same order. No remarkable differences in residue content between cooked and raw lard was observed. Fish meats and lard showed pollution by *p,p'*-DDT. Beta-BHC, which has been noted in human tissues, was not substantially detected, however, α-BHC was detected in almost all specimens except margarine. It was also noted that dieldrin still remained in yellowtail at a level as small as 10 ppb. [At the 27th Annu. Mtg. of the Japanese Soc. of Rural Med.]

79-0546. Wedberg, J. L.; Moore, S., III; Amore, F. J.; McAvoy, H. (Coll. Agric., Univ. Illinois, Urbana, IL 61801) **Organochlorine insecticide residues in bovine milk and manufactured milk products in Illinois, 1971-76.** *Pestic. Monit. J.* 11(4): 161-164; 1978. (2 references)

Monitoring activities were initiated in 1971 to survey the occurrence and levels of organochlorine insecticide residues in bovine milk and manufactured milk products in Illinois. Dieldrin residues were the most prevalent, and were found in 96% of the samples. Dieldrin also accounted for the highest average residue concentration (0.09 ppm). Only 0.3% of the samples contained illegal insecticide residues. Levels of DDT and lindane were generally declining, but those for dieldrin and heptachlor epoxide tended to remain constant. (Author abstract by permission)

79-0547. Bulkley, R. V. (Iowa Coop. Fish. Res. Unit., Iowa State Univ., Ames, IA 50011) **Variations in DDT concentration in muscle tissue of channel catfish, *Ictalurus punctatus*, from the Des Moines River, 1971.** *Pestic. Monit. J.* 11(4): 165-169; 1978. (8 references)

Concentrations of DDT in muscle tissue of channel catfish, *Ictalurus punctatus*, from the Des Moines River, Iowa, were compared in relation to length, age, sex, and fat content. Residue concentrations were not correlated with sex. Although residue concentrations were significantly correlated with size-related factors and fat content, they varied widely. Therefore, predictions of DDT concentrations in individual catfish on the basis of length, age, or muscle fat content may be grossly inaccurate. (Author abstract by permission)

79-0548. Peterson, S. R.; Ellarson, R. S. (Dep. Wildl. Resour., Univ. Idaho, Moscow, ID 83843) ***p,p'*-DDE, polychlorinated biphenyls, and endrin in oldsquaws in North America, 1969-1973.** *Pestic. Monit. J.* 11(4): 170-181; 1978. (34 references)

Organochlorinated compounds were monitored in oldsquaws (*Changula hyemalis*) and their food from Lake Michigan between October and May, 1969-72; in adult oldsquaws, eggs, young, and food from northwest Hudson Bay in 1971; and in oldsquaws from five wintering areas other than Lake Michigan in 1971-73. Analyses were conducted on 300 carcasses, 14 wings, 29 gullet samples, and 11 clutches. Average residues in carcasses from Lake Michigan ranged from 4 to 107 ppm PCB's, 2 to 42 ppm DDE, and < 0.1 to 0.7 ppm endrin. Differences in DDE levels occurred between several sex and age classes during December on Lake Michigan; these differences were not apparent in the spring. Increases in DDE and PCB residues for oldsquaws occurred on Lake Michigan between December and May. DDE residues in the wing and carcass were significantly correlated. Residues were relatively low in oldsquaw foods from Lake Michigan; concentration factors between the food and the ducks varied between 1 and 22 times, depending on the date and compound. Organochlorinated residues were lower in Arctic than in Lake Michigan food samples. DDE in paired male and female oldsquaws was highly correlated, as was DDE in females and clutches. Eggshell thickness had declined 4.5 % compared with eggs collected before 1947. Residues were highest in oldsquaws wintering on the Great Lakes and lowest in oldsquaws from coastal areas. (Author abstract by permission)

79-0549. Kurtz, D. (Pestic. Res. Lab. & Grad. Stud. Cent., Pennsylvania State Univ., University Park, PA 16802) **Residues of polychlorinated biphenyls, DDT, and DDT metabolites in Pennsylvania streams, community water supplies, and reservoirs, 1974-76.** *Pestic. Monit. J.* 11(4): 190-198; 1978. (25 references)

Pennsylvania streams, community water supplies, and open water reservoirs were analyzed for PCB mixtures, DDT, and DDT metabolites. Streams were sampled in 1974 and again in 1975. Only 4 of 19 stream locations were contaminated. Maximum concentrations in community supplies of Aroclor 1242 (2 locations), Aroclor 1254 (3 locations), and total DDT (2 locations) were 350, 260, and 620 ng/kg, respectively. Of the 110 community water supplies sampled in 1975 and 1976, only 7 contained residues. Maximum concentrations in community supplies of Aroclor 1242 (4 locations) and total DDT (2 locations) were 460 ng/kg and 75 ng/kg, respectively. The seventh contained 0.7 ng/kg of dieldrin. None of the three open water reservoirs contained detectable residues of the compounds of interest. Essentially no correlation was found between PCB and DDT analogs in streams and those in fish from streams which had been sampled at similar locations in a related study in 1976. (Author abstract by permission)

79-0550. Pearce, P. A.; Reynold, L. M.; Peakall, D. B. (Can. Wildl. Serv., Dep. Fish. & Environ., Fredericton, New Brunswick E3B 4Z9, Canada) **DDT residues in rainwater in New Brunswick and estimate of aerial transport of DDT into the gulf of St. Lawrence, 1967-68.** *Pestic. Monit. J.* 11(4): 199-204; 1978. (10 references)

Residues of DDT were detected in 76 of 101 samples of rainwater collected during spring and summer at several sites in the Province of New Brunswick in 1967 and 1968, and at one site in the Magdalen Islands, Quebec, in 1968. The dominant residue was *p,p'*-DDT. Levels of DDT and metabolites combined ranged from < 0.01 to 1.33 μg/kg. Levels of DDT and metabolites in the pollen of four species of forest trees in New Brunswick ranged from 0.544 to 1.01 mg/kg; such contaminated pollen possibly contributed to residues in rainwater. Residue data for rainwater from two sites were used to estimate the amount of DDT aerially transported into the Gulf of St. Lawrence during July to October 1968. (Author abstract by permission)

79-0551. Ware, G. W.; Estesen, B. J.; Buck, N. A.; Cahill, W. P. (Dep. Entomol., Univ. Arizona, Tucson, AZ 85721) **DDT moratorium in Arizona-agricultural residues after seven years.** *Pestic. Monit. J.* 12(1): 1-3; 1978. (5 references)

The moratorium on agricultural use of DDT in Arizona that began in January 1969 proved very effective during the first 7 yr of enforcement. Residues on green alfalfa declined significantly to a probable inherent level of 0.02 ppm wet weight. Soil residues of total DDT-related degradation products declined significantly, averaging 23%; residues in desert soils declined 60%. The total DDT half-life in irrigated soils was about 7 yr; it decreased to 2.5 yr in nonirrigated soils. (Author abstract by permission)

79-0552. Greichus, Y. A.; Gueck, B. D.; Ammann, B. D. (Stn. Biochem. Sect., Chem. Dep., South Dakota State Univ., Brookings, SD 57007) **Organochlorine insecticide, polychlorinated biphenyl, and metal residues in some South Dakota birds, 1975-76.** *Pestic. Monit. J.* 12(1): 4-7; 1978. (18 references)

Chlorinated hydrocarbon insecticide, polychlorinated biphenyl (PCB), and metal residues were measured in tissues of common crows (*Corvus brachyrhynchos*), American coots (*Fulica americana*), starlings (*Sturnus vulgaris*), and Franklin's gulls (*Larus pipixcan*), of South Dakota in 1975-76. Insecticides and PCB's were analyzed by column, thin-layer, and gas-liquid chromatography. Metals were analyzed by atomic absorption spectrophotometry. DDE was the most prevalent residue; it was detected in 93% of all samples and averaged 66% of the total residues in the carcass. Average values ranged from 0.04 ppm to 0.54 ppm. Dieldrin was detected in 61% of all samples and averaged < 0.01 ppm to 0.15 ppm. TDE and DDT were found in 27% and 15%, respectively, of all samples, and the averages for both ranged from < 0.01 ppm to 0.06 ppm. Heptachlor epoxide and lindane were detected in some samples. PCB's were not found above the minimum detectable level, 0.1 ppm, in any sample.

Gulls had higher insecticide and metal residues than had coots, starlings, or crows. Arsenic values average 1.4 ppm dry weight in carcass samples from the four species of birds. Cadmium, copper, manganese, lead, and zinc averaged 0.10, 0.94, 4.8, 1.0, and 69 ppm dry weight, respectively, and were no higher than values reported in some birds from other areas. (Author abstract by permission)

79-0553. Johnston, D. W. (Dep. Zool., Univ. Florida, Gainesville, FL 32611) **Organochlorine pesticide residues in Florida birds of prey, 1969-76.** *Pestic. Monit. J.* 12(1): 8-15; 1978. (18 references)

Chlorinated hydrocarbon pesticide residues, especially DDT and its metabolites, were determined in 71 individuals of 14 species of predatory birds obtained in Florida between 1969 and 1976. Of the 71 birds, 68 contained *p,p'*-DDE or another DDT metabolite; 34 contained dieldrin. DDE was found in 93 % of the 57 adipose tissue samples, all the 9 brain samples, and 89 % of the 62 uropygial gland samples. Of the 65 birds taken since 1972, 61 contained DDE in at least one of these three tissues. The annual average of total DDT in adipose tissue and uropygial gland over the 6-yr span was approximately 5 ppm wet weight. From 1973 to 1976, no significant increase or decrease in pesticide burdens was detected. Some birds had no DDE whereas others contained up to 76 ppm total DDT. None of the data suggest that any of the birds of prey had diet of DDT or DDT metabolite poisoning. (Author abstract by permission)

79-0554. King, K. A.; Flickinger, E. L.; Hildebrand, H. H. (Patuxent Wildl. Res. Cent., Fish & Wildl. Serv., US Dep. Inter., Victoria, TX 77901) **Shell thinning and pesticide residues in Texas aquatic bird eggs, 1970.** *Pestic. Monit. J.* 12(1): 16-21; 1978. (30 references)

Significant decreases in eggshell thickness were found in 15 of 22 species of aquatic birds in Texas in 1970. Shell thickness reductions of 9 to 15% were found in white pelicans (*Pelecanus erythrorhynchos*), brown pelicans (*P. occidentalis*), and great blue herons (*Ardea herodias*). DDT family compounds were found in all eggs, and mean residues ranged from 0.4 ppm in white ibis (*Eudocimus albus*) to 23.2 ppm in great egrets (*Casmerodius albus*). Total DDT residues were negatively correlated with shell thickness in five species; PCB's were negatively correlated in two. Residues in marine birds were generally lower and more uniform than levels in birds feeding in fresh and brackish water. DDT and dieldrin residues were higher in eggs from colonies near agricultural areas where these insecticides were heavily used; higher PCB residues were consistently associated with urban and industrial areas. Populations of five species have declined and deserve continued study: brown pelican, reddish egret (*Dichromanassa refuescens*), white-faced ibis (*Plegadis chihi*), laughing gull (*Larus atricilla*), and Forster's tern (*Sterna forsteri*). Population trends of four other species were undetermined and should be followed closely in future years. (Author abstract by permission)

79-0555. McLane, M. A. R.; Dustman, E. H.; Clark, E. R.; Hughes, D. L. (Patuxent Wildl. Res. Cent., Fish & Wildl. Serv., US Dep. Inter., Laural MD 20811) **Organochlorine insecticide and polychlorinated biphenyl residues in woodcock wings, 1971-72.** *Pestic. Monit. J.* 12(1): 22-25; 1978. (8 references)

Pesticide residues in wings of adult woodcock (*Philohela minor*) were used to monitor regional differences in a 1970-71 survey of DDT, DDE, TDE, dieldrin, mirex, and PCB's in Maine, New Hampshire, New York, New Jersey, Pennsylvania, North Carolina, South Carolina, Georgia, Louisiana, Michigan, and Wisconsin. In 1971-72, wings were sampled again to compare levels of organochlorine insecticide residues with those of the previous survey and to delineate differences in residue values between adult and immature woodcock. Three additional states, Massachusetts, Minnesota, and Vermont, and one additional organochlorine insecticide, heptachlor epoxide, were included in the second survey. Residue levels in the 1971-72 wings showed the same pattern as that observed in 1970-71: organochlorine insecticide residues were highest in wings collected in the southern states and in New Jersey; residues were lowest in samplings taken in the northern and midwestern states. Residues of DDT, TDE, and dieldrin in the 1971-72 wings were slightly lower than those found in 1970-71. DDE, PCB, and mirex residues were significantly lower ($P < 0.05$, $P < 0.01$, and $P < 0.01$, respectively) in 1971-72. Wings of immature woodcock in Louisiana had signficantly lower ($P < 0.05$) mirex residues than did adult wings. (Author abstract by permission)

79-0556. Sarkka, J.; Hattula, M.-L.; Janatuinen, J.; Paasivirta, J.; Palokangas, R. (Dep. Biol., Univ. Jyvaskyla, SI-40100 Jyvaskyla 10, Finland) **Chlorinated hydrocarbons and mercury in birds of Lake Paijanne, Finland-1972-74.** *Pestic. Monit. J.* 12(1): 26-35; 1978. (36 references)

The levels of mercury, PCB's, DDT and its analogs, lindane, and dieldrin were examined in aquatic birds nesting on the shores of Lake Paijanne, the second largest lake in Finland, which is polluted by a wood-processing industry and urban sewages. The primary food of the 10 species examined was fish. In muscle of about 350 individuals, the highest average residues were PCB's; in livers, mercury was the highest. Lindane was found in some individuals; dieldrin appeared in none. The differences among levels in 1972, 1973, and 1974 were not significant. Some regional differences were found, particularly for mercury. Some PCB contamination was observed near the town of Jyvaskyla. DDT was distributed evenly. A stronger correlation existed between residues of PCB's and DDT than between residues of any other compounds. In some gulls, males had higher average residues than had females. The DDT:PCB ratio generally corresponded to that of the North Atlantic Ocean, but the difference among species was great. Higher mercury, PCB, and DDT values existed in adults than in juveniles; higher mercury values existed in livers than in muscles. Black-throated divers had highest mercury residues; in herring gulls, PCB's and

DDT were highest. The levels generally correspond to those found in other studies. (Author abstract by permission)

79-0557. Zabib, M. E.; Olson, B.; Johnson, T. M. (Dep. Food Sci. & Hum. Nutr., Michigan State Univ., East Lansing, MI 48824) **Dieldrin, DDT, PCB's, and mercury levels in freshwater mullet from the Upper Great Lakes, 1975-76.** *Pestic. Monit. J.* 12(1): 36-39; 1978. (7 references)

Freshwater mullet harvested commercially during various seasons of 1975-76 from the upper Great Lakes were analyzed for organochlorine pesticides, PCBs, and mercury. Species analyzed were *Catostomus commersoni, C. catostomus,* and *Moxostoma erythruran.* Whole ground fish, mechanically deboned flesh, head, middle, and tail steaks, and various muscles were analyzed for pesticides and PCB's; only edible flesh was analyzed for mercury. Dieldrin ranged from none detected to 0.23 ppm in deboned and whole ground samples, the DDT range was a trace to 0.30 ppm, and PCB's ranged from 0.06 ppm to 0.79 ppm. Levels were also higher in head sections and in high fat-containing medial muscle and belly flap. Mercury levels ranged from 0.03 ppm to 0.28 ppm in the flesh of mullet from Lake Michigan. (Author abstract by permission)

79-0558. de la Cruz, A. A.; Lue, K. Y. (Dep. Biol. Sci., Mississippi State Univ., Mississippi State, MS 39762) **Mirex incorporation in estuarine animals, sediment, and water, Mississippi Gulf Coast-1972-1974.** *Pestic. Monit. J.* 12(1): 40-42; 1978. (11 references)

Analysis of mirex residues in estuarine animals, sediments, and waters collected from the Mississippi Gulf Coast in 1972-74 showed the following ranges of concentrations: seston, 200-3000 ppb; molluscs, 36-500 ppb; fish, 0-259 ppb; sediment, 3-5 ppb; and water, 0-0.01 ppb. These data indicate that mirex in aquatic environments is localized in animal tissues and bottom substrate and that only a negligible amount is incorporated in the water. (Author abstract by permission)

79-0559. Smelt, J. H.; Leistra, M.; Houx, N. W. H.; Dekker, A. (Lab. Res. Insectic., Wageningen, The Netherlands) **Conversion rates of aldicarb and its oxidation products in soils. I. Aldicarb sulphone.** *Pestic. Sci.* 9(4): 279-285; 1978. (14 references)

The rate of loss of aldicarb sulphone was studied in incubation experiments on soils from four plough layers and two deeper layers. In all instances the loss could be described by first-order kinetics in the first period of two to three times half-life. However, in a clay loam soil and a greenhouse soil a faster degradation rate was observed after the first 56 and 112 days of incubation, respectively. The half-lives of sulphone in plough layer soils at 15°C ranged from 18 days in a clay loam to 154 days in a peaty sand. Conversion in deeper layers was considerably slower than in the corresponding top layers of the soil profile. In a silty layer at 70 to 90 cm depth the half-life at 15°C was 46 days, whereas in a sand layer at 90-110 cm no clear loss was found during the 294 days of incubation. (Author abstract by permission)

79-0560. Smelt, J. H.; Leistra, M.; Houx, N. W. H.; Dekker, A. (Lab. Res. Insectic., Wageningen, The Netherlands) **Conversion rates of aldicarb and its oxidation products in soil. II. Aldicarb sulphoxide.** *Pestic. Sci.* 9(4): 286-292; 1978. (6 references)

The loss of aldicarb sulphoxide was studied in incubation experiments with soil from four plough layers and two deeper layers. The loss during the 111 days of the experiment could be described by first-order kinetics. The half-lives at 15°C ranged from 20 days in a clay loam to 46 days in a peaty sand. The loss of sulphoxide in deeper layers was considerably slower than in the corresponding top layers of a soil profile. In soil from a silty layer at 70-90 cm depth the half-live was about 53 days. In soil from a sand layer at 90-110 cm depth a loss of only about 15% was measured after 111 days of incubation. First-order rate constants for sulphoxide conversion in a clay loam at 6, 15 and 25°C were found to be 0.009, 0.033, and 0.05/day respectively; in a greenhouse soil these rate constants were 0.0052, 0.019 and 0.04/day respectively. The fractions of aldicarb sulphoxide that were oxidized to sulphone at 15°C in soil from plough layers were computed to range from 0.52 to 0.76. (Author abstract by permission)

79-0561. Smelt, J. H.; Leistra, M.; Houx, N. W. H.; Dekker, A. (Lab. Res. Insectic., Wageningen, The Netherlands) **Conversion rates of aldicarb and its oxidation products in soils. III, Aldicarb.** *Pestic. Sci.* 9(4): 293-300; 1978. (9 references)

Aldicarb was incubated in seven soils at 15°C and its loss was well described by first-order kinetics. Rate constants varied between 0.078 day in a peaty sand to 0.35 day in a clay loam. The concentration-time relationships for aldicarb, its sulphoxide and its sulphone were approximated by a computation model which was used to analyze the importance of the various consecutive and simultaneous reactions. It was computed that 91 to 100% of the aldicarb would be oxidized to its sulphoxide. (Author abstract by permission)

79-0562. Rouchaud, J.; Moons, C.; Decallonne, J. R.; Meyer, J. A. (Lab. Phytopathol., Univ. Cathol. Louvain, Louvain-la-Neuve, Belgium) **Photodecomposition of piperazine in water by 'sunlight' ultraviolet radiation.** *Pestic. Sci.* 9(4): 305-309; 1978. (8 references)

A solution of piperazine in water was photochemically oxidized by the dissolved oxygen when irradiated with 'sunlight' ultraviolet radiation obtained with a Hanau Q-300 lamp, or with RUL-300 nm lamps. Sensitizers (riboflavin, acetone and benzophenone) did not increase the rate of the oxidation induced by the RUL-300 nm lamps; however, they (especially riboflavin) accelerated the oxidation induced by the Hanau Q-300 lamp. A large number of products were observed in the sensitized oxidation but they were not analyzed further. The irradiation mixture of the non-sensitized photooxidation, when 65% of the initial piperazine had been transformed, contained piperazine (35%), glycine (approximately 25%) and three unidentified compounds in equal

amounts (approximately 13% each); the same products were obtained with both irradiation systems. The photo-oxidation of piperazine, a metabolite of the fungicide triforine, 1,4-bis(2,2,2-trichloro- 1-formamidoethyl) piperazine, could thus be a way for the latter's biodegradation at a surface, or in plant tissues, this biodegradation having already been observed. (Author abstract by permission)

79-0563. Loeffler, R. S. T. (Long Ashton Res. Stn., Bristol BS18 9AF, England) **Identification of the photochemical decomposition product of chlorothalonil by ^{13}C n.m.r. spectroscopy.** *Pestic. Sci.* 9(4): 310-312; 1978. (4 references)

The light-induced decomposition of chlorothalonil (2,4,5,6-tetrachloro isophthalonitrile) in benzene and toluene was found to give rise to one and three products respectively. These were shown by gas chromatography-mass spectrometry to be trichloro dicyanobiphenyls and the benzene adduct was fully identified by ^{13}C n.m.r. spectroscopy as 2,4-dicyano-3,5,6-trichlorobiphenyl. (Author abstract by permission)

79-0564. Walker, A. (Natl. Veg. Res. Stn., Warwick CV35 9EF, England) **The degradation of methazole in soil. I. Effects of soil type, soil temperature and soil moisture content.** *Pestic. Sci.* 9(4): 326-332; 1978. (9 references)

^{14}C-Labelled methazole was incubated in six soils at 25°C and with soil moisture at field capacity. Under these conditions, methazole was unstable, the concentration declined following first-order kinetics with half-life values in the soils ranging from 2.3 to 5.0 days. The main degradation product was 1-(3,4-dichlorophenyl)- 3-methylurea (DCPMU) which was more stable than the parent compound. After about 160 days, DCPMU accounted for 30 to 45% of the initial methazole concentration. Degradation of methazole and DCPMU was affected by soil temperature and moisture content. With methazole, half-lives in one soil at field capacity moisture content and temperatures of 25, 15 and 5°C were 3.5, 8.7 and 31.1 days, respectively. The half-life at 25°C was increased to 5.0 days at 50% of field capacity and 9.6 days at 25% of field capacity. A proportion of the initial radioactivity added to the soil could not be extracted and this proportion increased with time. After 160 days this unextractable radioactivity accounted for up to 70% of the amount applied. (Author abstract by permission)

79-0565. Walker, A.; Roberts, M. G. (Natl. Veg. Res. Stn., Warwick CV35 9EF, England) **The degradation of methazole in soil. II. Studies with methazole, methazole degradation products and diuron.** *Pestic. Sci.* 9(4): 333-341; 1978. (12 references)

^{14}C-Labelled methazole, 1-(3,4-dichlorophenyl)-3-methylurea (DCPMU), 1-(3,4-dichlorophenyl)urea (DCPU), and diuron were incubated in soil at 20°C and field capacity soil moisture content. Decomposition followed first-order kinetics; half-lives for degradation of these four compounds were 2.4, 144, 30, and 108 days, respectively. The amount of DCPMU and DCPU that could be extracted decreased with time and the decrease was accompanied by the generation of an equivalent amount of $^{14}CO_2$. This was not so in the studies with diuron and methazole, however, and the decrease in the concentrations of radioactivity extracted from soil treated with these compounds could not be entirely accounted for as carbon dioxide. It is concluded that the unextractable radiochemical that was present was DCPMU. Methazole appeared to be degraded through DCPMU to 3,4-dichloroaniline (DCA) with the production of only traces of DCPU. (Author abstract by permission)

79-0566. Bowmer, K. H.; Adeney, J. A. (CSIRO, Div. Irrig. Res., Griffith, New South Wales, Austrailia) **Residues of diuron and phytotoxic degradation products in aquatic situations. II. Diuron in irrigation water.** *Pestic. Sci.* 9(4): 354-364; 1978. (11 references)

When diuron is used as a soil-residual herbicide in irrigation canals, water quality is protected in standard practice by 'flushing'-the diversion of the first discharge of water to the drainage system before irrigation is resumed. In three canals treated with diuron at about 40-45 kg/ha, flushing for 4 hr was relatively inefficient, removing 15% or less of the residual diuron in the sediment. In one other canal approximately 40% was removed during flushing. Cumulative loss of diuron was proportional to be square root of the time of water discharge. The effect of the time interval between treatment and flushing was investigated in trials on soils of typically heavy texture. When flushing closely followed treatment about 6 kg diuron/ha was removed, but in three trials, for a range of times from treatment of 5-15 wk, losses were similar (about 2.5 kg/ha), suggesting that a restriction of longer than 5 wk is unlikely to reduce contamination. In a contrasting soil of sandier texture greater movement of diuron away from the sediment surface probably contributed to a five-fold reduction of diuron extracted in flushing. These data were used to calculate the effects of flushing time on both the concentrations of diuron in water discharged to drains for subsequent re-use and the concentrations in the irrigation water, to aid assessment of hazard to crops. Flushing times required for residues in water to reach 0.1 μg/ml, calculated by extrapolation, were in the order of days so that it may be necessary to restrict the use of diuron to farms which can retain the discharge water within their own boundaries, or to areas where dilution in receiving waters can be shown to be adequate. (Author abstract by permission)

79-0567. Cason, R.; Reed, L. W. (Dep. Agron., Oklahoma State Univ., Stillwater, OK 74074) **Chemistry of two clay systems and three phenoxy herbicides.** *Proc. Okla. Acad. Sci.* 57: 116-118; 1977. (6 references)

The adsorption and absorption of three phenoxy herbicides were studied using clay minerals including fine Georgia kaolinite, coarse Georgia kaolinite, and fine Camargo bentointe from northwestern Oklahoma. The following herbicide solutions were prepared: 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) (0.225 g/100 ml), 2-(2,4,5-trichlorophenoxy)propionic acid (0.269 g/100 ml), and 2,4-dichloro-

phenoxyacetic acid (2,4-D) (0.221 g/100 ml). Enough solution of each herbicide was added to 10 ml of each clay suspension to supply one, two and three millimoles of herbicide per milliequivalent of the previously determined cation-exchange capacity of each clay mineral suspension. Changes in the levels of organic herbicides applied had no effect on percent sorption. In every case the organic herbicides were sorbed in amounts close to the cation exchange capacity of the clay. Sorbtion did not occur on the interlayer surfaces of the clay minerals as evidenced by the fact that the basal spacings were not altered. Practically none of the interlayer free water in the structure was displaced by the herbicide. The phenoxy particles were probably bound at the edges of the particles at charged sites.

79-0568. Baluja, G. ; Murado, M. A.; Hernandez, L. M. (Inst. Quim. Org. Gen., Madrid, Spain) **Contaminacion del medio por plaguicidas organoclorados. XI. Estudio de la contaminacion por compuestos organoclorados en algunas comunidades de la Reserva Biologica de Donana. [Environmental pollution by organochlorine pesticides. XI. Study of the contamination by organochlorine compounds in some communities of the Biological Reservation of Donana (Spain).]** *Rev. Agroquim. Technol. Aliment* 17(4): 481-491; 1977. (17 references) (Spanish)

The PCB and organochlorine pesticide residue levels were studied in the trophic chains in the Biological Reservation of Donana, Spain, during the 1972-1974 period. The residue levels were found to increase through the trophic chain from water and soil, aquatic plants, phytophagous species, and culminating in rapacious birds. The concentrations found in water and/or soil were 0.020 ppm for *p,p'*-DDE, and 0.0002 ppm for *p,p'*-DDT, and total DDT. The residue levels found in aquatic plants were 0.099 ppm for α-BHC, 0.395 ppm for lindane, 0.01 ppm for *p,p'*-DDE, 0.046 ppm for *p,p'*-DDT, 0.093 ppm for PCB's, and 0.056 ppm for total DDT. The concentrations found in *Ardea purpurea* were 0.06-0.106 ppm for α-BHC, 0.016-0.106 ppm for lindane, 0.006-0.018 ppm for heptachlor, 0.167-0.283 ppm for *p,p'*-DDE, 0.019-0.038 ppm for *p,p'*-TDE, 0.035-0.090 ppm for *p,p'*-DDT, 0.247-0.593 ppm for PCB's, and 0.225-0.392 ppm for total DDT. The residue levels showed an annual increase by a factor of 4.4 in predatory species, and by a factor of 1.4 in phytophagous species.

79-0569. Lafleur, K. S.; McCaskill, W. R.; Gale, G. T., Jr. (Coll. Agric. Sci., Clemson Univ., Clemson, SC 29631) **Trifluralin persistence in congaree soil.** *Soil Sci.* 126(5): 285-289; 1978. (16 references)

Three 0.01 ha Congaree soil plots were sprayed with a 200 l/ha aqueous emulsion which contained 2 kg/ha formulated trifluralin (Treflan EC). Incorporation of the trifluralin was accomplished by hand raking. The top meter of soil was monitored for trifluralin content and underlying groundwater was similarly monitored for 1024 days. During the period of study the rainfall measured 420 cm. Trifluralin remained within the top 20 cm of soil after placement with its concentration decreasing nonlinearly with time. There was an initial more rapid loss of the herbicide with the half-life of this initial period being 19 days. Subsequently the herbicide was not lost as readily with the half life of this later period being 450 days. It is suggested that two-stage or multistage first-order kinetics may provide a more suitable model for predicting residue dissipation than the simple first-order kinetics model.

79-0570. Podlejski, J.; Dervieux, A. M. (Cent. Ecol. Camargue, CNRS F-13200 Arles, France) **Persistance de quatre produits phytosanitaires dans les eaux de rizieres en Camargue; caracterisation de leurs effets sur l'ecosysteme. [Persistence of four pesticides in waters of rice fields in the Camargue and their effect on the ecosystem.]** *Trav. Soc. Pharm. Montpellier* 38(2): 153-164; 1978. (15 references) (French)

The persistence (half-life) of the insecticides γ-HCH (lindane) and parathion, the herbicides propanil (3,4-dichloro propion anilide) and molinate (hexamethylene iminoethyl carbothioethylate) as well as of 3,4-DCA (3,4-dichloroaniline), a degradation product of propanil, in an experimental 1 ha rice field under 9 cm of water in the Camargue was determined, and the ecological consequences of pesticide applications on the flora and fauna of the rice field were discussed. Persistence was uniformly found to be low but the short-time effect following application was found to have lethal effects or reduce the biological activity of *Daphnia magna, D. pulex*, and *Gammarus fasciatus*. Persistance of the compound, after application of the compounds, after application by evenly distributed pulverization on the surface for Molinate was 4.95 mg/l reduced to 0.14 mg/l in 13 days, for lindane 55 mg/cm^3 reduced to 0.23 mg/m^3 in 8 days, for parathion 59 mg/m^3 reduced to 0.01 mg/m^3 in 8 days, for propanil 2.76 mg/l reduced to 0.003 mg/l in 3.5 days, and for 3,4-DCA 0.07 mg/l reduced to 0.007 mg/l in 8.2 days. Pesticides levels in the rice field sediment were not analyzed.

79-0571. Young, D. R.; Heesen, T. C. (South. California Coastal Water Res. Proj., El Segundo, CA 90245) **DDT, PCB, and chlorinated benzenes in the marine ecosystem off Southern California.** In: *Environmental Impact of Water Chlorination, Proceedings of the Conference.* Jolley, R. L., et al., eds.; (Ann Arbor: Ann Arbor Sci.) 2:267-290; 1978. (29 references)

DDT and PCB inputs, distributions, and impacts in the Southern California Bight are detailed from the time period from 1972 to 1976. Various sources of these contaminants were municipal wastewater, harbor industrial wastes, antifouling paint, surface runoff, aerial fallout and ocean currents. Various conclusions which can be drawn from the study suggest that concentrations of DDT, PCB and chlorinated benzenes found in flatfish which reside in the organic-rich bottom sediments around major municipal outfalls are related to the concentrations of these chlorinated hydrocarbons in the sediments themselves. DDT and PCB contamination of such bottom sediments seems to have caused persistent contamination of this benthic fish and intertidal mussels

living inshore of the discharge. DDT residues near the FDA 5 ppm limit in another fish seem to have been responsible for the deaths of captive marine birds fed with these fish for more than one year. Various seafood organisms collected off Palos Verdes Peninsula may not be fit for human consumption. The dominant source of measurable chlorinated benzenes in this area was unchlorinated municipal wastewater. The much higher inputs of DDT and PCB residues in the past account for their present high concentrations in these areas of concern.

See also 79-0577, 79-0729 *and* 79-0747.

79-0572. Jusic, A.; Milic, S. (Cent. Neuromuscular Dis., Dep. Neurol., Univ. Zagreb, Zegreb, Yugoslavia) **Neuromuscular synapse testing in two cases of suicidal organophosphorus pesticide poisoning.** *Arch. Environ. Health* 33(5): 240-243; 1978. (8 references)

Two cases of suicidal poisoning with organophosphorus pesticides are presented. The first case involved a 16-yr-old girl who ingested 200 ml malathion. She died seven days later with myosis, cyanosis and low blood pressure. The second case involved a 63-yr-old woman who drank a full glass of Thiometon 50% (Ekatin) while in a state of reactive depression. In each case electromyographic neuromuscular testing was performed. Each patient had a very low blood cholinesterase activity. Electromyographic results did not differ significantly from those obtained in healthy non-exposed adults. Neuromuscular synapse function was viewed as normal.

79-0573. Lores, E. M.; Bradway, D. E.; Moseman, R. F. (Health Eff. Res. Lab., Environ. Res. Cent., EPA, Research Triangle Park, NC) **Organophosphorus pesticide poisonings in humans: Determination of residues and metabolites in tissues and urine.** *Arch. Environ. Health* 33(5): 270-276; 1978. (7 references)

Four cases of organophosphorus poisoning in humans are described. Three of the patients died. The chemicals involved were dicrotophos, chlorpyrifos, malathion, and parathion. In one case the exposure came about through working in a field too soon after the application of an insecticide had been completed. The other cases involved ingestion of the toxicants. The methods of analysis used in these cases were adapted from previously published methods which provided a very rapid means of identification of organophosphates in the tissues or in the blood of poisoned patients. In each case alkyl phosphate analysis was a more sensitive indicator of exposure than analysis for intact pesticides, except when samples of brain tissue were used. However, it is noted that measurement of the intact pesticide combined wth the alkyl phosphate analysis gave a better indication of the type and level of exposure.

79-0574. Favarel-Garrigues, J.-Cl.; Castaing, Y. (Cent. Reanim. & Cent. Anti-Poison, Bordeaux, France) **Quelques intoxications professionelles aigues (a partir de l'experience du Centre anti-poison de Bordeaux.) [Report on cases of occupational poisoning from the files of the Poison Control Center of Bordeaux.]** *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 39(4): 324-327; 1978. (French)

Occupational poisonings are relatively rare in the Bordeaux region because of the low level of industrialization. Incidents of this type reported to the Bordeaux Poison Control Center in the past 10 years have included 52 cases of trichloroethylene poisoning, 50 cases of acute intoxication by organophosphorus pesticides (28 of them occupational), 43 cases of corrosive gas inhalation (most of them mild), and 52 cases of corrosive liquid ingestion. Initial signs, appearing about 30 min after organophosphate ingestion, include a slight vagomimetic syndrome, asthmatiform dyspnea, and vision disorders. These are followed by nicotinic and muscarinic symptoms and possibly by coma. Laboratory diagnostic measures include determination of urinary p-nitrophenol and blood cholinesterase activity. Treatment with atropine and pralidoxime, possibly with addition of metaraminol in cases of shock, is generally followed by gradual alleviation of symptoms.

79-0575. Everall, J. D.; Dowd, P. M. (Skin Dep., The Royal Marsden Hosp., London S.W.3, England) **Influence of environmental factors excluding ultraviolet radiation on the incidence of skin cancer.** *Bull. Cancer* 65(3): 241-248; 1978. (5 references)

Although it is the most common form of cancer in the United States, skin cancer is not adequately included in the cancer registries, and information on its epidemiology is sparse. Principal causes of skin cancer are polycyclic aromatic hydrocarbons, found in various oils and soot, inorganic arsenic, and ionizing radiation. Inorganic arsenic carcinogenesis results from inhalation and ingestion and produces multicentric carcinomas. Arsenic exposure occurs during ore refining, manufacture of insecticides and herbicides, glassmaking, preservation of hides and wood, and the manufacturing and handling of sheep and cattle dips. Medical application of arsenic has also resulted in cancer development. An outbreak of arsenical cancer occurred in German vineyard workers after World War II when arsenical pesticides were applied. The etiology of arsenical cancer is often obscured by its long latency period.

79-0576. Fontaine, R. E.; Pull, J. H.; Payne, D.; Pardhan, G. D.; Joshi, G. P.; Pearson, J. A.; Thymakis, M. K.; Camacho, M. E. R. (Extension Entomol., Univ. California, Davis, CA 95616) **Evaluation of fenitrothion for the control of malaria.** *Bull. WHO* 56(3): 445-452; 1978. (9 references)

Fenitrothion (40% wettable powder) was applied inside dwellings at a fixed dosage of 2 g technical product/m^2 at intervals of 3 mo for controlling malaria in Nyanza Province, Kenya. Good control of malaria incidence and prevalence was obtained. Toxicological data showed the insecticide was safe when recommended precautions were observed. The chemical was stored safely and handled carefully. Spraymen used protective clothing consisting of water-repellant overalls, canvas ankle boots, broad-brimmed hats of flexible plastic and a surgical-type face mask. Water and soap were given to spraymen to remove spray residue from exposed skin after preparation of each pump charge. Daily exposure was limited to six hr. Spray crews were transported rapidly to field stations. Daily showers were given with the issuance of clean overalls each morning. Blood cholinesterase activity was monitored weekly by the tintometric method.

79-0577. Moccia, R. D.; Leatherland, J. F.; Sonstegard, R. A.; Holdrinet, M. V. H. (Dep. Zool., Coll. Biol. Sci., Univ. Guelph, Guelph, Ontario, Canada) **Are goiter frequencies in**

Great Lakes salmon correlated with organochlorine residues? *Chemosphere* 7(8): 649-652; 1978. (17 references)

Organochlorine pesticides (OC) levels in coho salmon (*Oncorhynchus kisutch*) in the Great Lakes region were examined for possible correlation between pesticide levels and the presence of goiters. Muscle samples, extending from below the dorsal fin to the central surface, were taken from randomly selected male and female fish from Lakes Michigan, Huron, Erie, and Ontario. Salmon from Lake Ontario had the highest total OC levels (x 10.82 mg/kg); lowest levels were found in Lake Erie (x 1.47 mg/kg). In all cases PCB's and DDE represented the major OC contaminants (86% of the total). Mirex and photomirex were only present in samples from Ontario in small levels (x 0.23 mg/kg). Spring salmon had lower levels of all pesticides than did fall fish. No correlation was found between OC levels and goiter frequency. The highest goiter frequency (79.5%) was found in Lake Erie, where the total OC content of muscles was only 1.47 mg/kg.

79-0578. Slichter, S. J.; Harker, L. A. (Univ. Washington, Seattle, WA) **Thrombocytopenia: Mechanisms and management of defects in platelet production.** *Clin. Haematol.* 7(3): 523-539; 1978. (80 references)

Disorders of platelet production are discussed along with a suggested management approach for patients with severe thrombocytopenia refractory to random donor platelets and other therapeutic efforts. Megakaryocyte aplasia or hypoplasia may be caused by radiation, chemicals, drugs, infections and other agents. Insecticides such as chlorophenothane (DDT), chlordane and γ-benzene hexachloride (lindane) have been associated with marrow-related thrombocytopenia. These disorders may disappear following cessation of exposure. From available results of *in vitro* testing combined with transfusion studies in alloimmunized thrombocytopenic patients it was concluded that family members offer compatible platelet transfusions for about half of the patients. HLA matching was not always sufficient for compatibility prediction. It was also evident that compatible unrelated random donors can be identified by platelet crossmatching procedures from persons who share at least two HLA antigens with the thrombocytopenic patient.

79-0579. Krebs, C. T.; Valiela, I. (Sci. Div., St. Mary's Coll. of Maryland, St. Mary's City, MD 20686) **Effect of experimentally applied chlorinated hydrocarbons on the biomass of the fiddler crab, *Uca pugnax* (Smith).** *Estuarine Coastal Mar. Sci.* 6(4): 375-386; 1978. (48 references)

Sewage sludge in the form of a commercially available fertilizer was added to salt marsh plots inhabited by fiddler crabs, *Uca pugnax* (Smith). The sludge was contaminated with 76 ppm aldrin and 1.3 ppm dieldrin. The density of crabs with carapace widths greater than 5 mm in treated plots decreased to 47 crabs/m² at a low dose of the sludge and to 16 crabs/m² under a higher dose, compared with 113 crabs/m² in control plots. Juvenile densities were reduced from 401 crabs/m² in control plots to 161 crabs/m² in the low dose plots and to 107 crabs/m² in the high dose plots. Fiddler crabs have a higher salt marsh biomass than most other invertebrates. Thus it was recognized that contamination with chlorinated hydrocarbons affects a principal component of the salt marsh fauna.

79-0580. Potashnik, G.; Ben Aderet, N.; Israeli, R.; Yanai-Inbar, I.; Sober, I. (Infertil. Unit, Dep. Obstet. Gynecol. A, Soroka Med. Cent., Beer-Sheba, Israel) **Suppressive effect of 1,2-dibromo-3- chloropropane on human spermatogenesis.** *Fertil. Steril.* 30(4): 444-447; 1978. (6 references)

Six workers in a DBCP production line at a local factory were examined. Azoospermia was diagnosed in each case. The presenting symptom in two patients was infertility, and a decrease in libido or impotence characterized the other patients. Elevated plasma follicle-stimulating hormone levels were demonstrated. Normal plasma lutenizing hormone and testosterone concentrations were found. Selective atrophy of ther germinal epithelium, intact Sertoli cells, and a relatively increased number of Leydig cells of normal appearance were found on testicular biopsy.

79-0581. Atabaev, Sh. T.; Boiko, I. B.; Il'ina, V. A. (Uzbek Sci. Res. Inst. Sanit. Hyg. & Occup. Dis. Tashkent, USSR) **Vliyanie pestitsidov na immunologicheskie sostoyanie organizma. [Effect of pesticides on the immune status of the body.]** *Gig. Sanit.* 43(8): 7-10; 1978. (2 references) (Russian)

The effect of the pesticides basudin (diazinon), polychloropinene (strobane) and calcium cyanamide on the immune status was studied in farm workers exposed to these compounds occupationally and in rats. Antibodies to these pesticides were found in the blood serum of 72.2% of the workers in titers ranging from 1:20 to 1:160. The rats were treated with 0.05 to 0.001 LD50 doses of basudin, polychloropinene and calcium cyanamide po for 2 wk to 4 mo. The antibody titers were 1:17 to 1:80 to basudin, 1:17 to 1:142 to polychloropinene, and 1:23 to 1:57 to calcium cyanamide. The findings indicate that the immune reactions were most intense to organochlorine pesticides due to their accumulation, and that the impairment of the status is one of the earliest signs of toxic changes during the latent period.

79-0582. Birkmeier, J. L.; LaRocca, S. A.; Haulsee, R. E. (ICI Americas, Inc., Cent. Eng. Dept., Wilmington, DE) **Activated carbon removes pesticides from wastewater at research facility.** *Ind. Wastes (Chicago)* 24(5): 20-24; 1978.

A method was developed for removing pesticide compounds from the wastewater of a research facility whose wastewater consists of sanitary sewage and an effluent containing herbicides, fungicides, insecticides and organic solvents. Various alternate methods, including incineration, oxidation, and biological treatment were rejected as being too costly or not applicable to the situation. A system involving activated carbon adsorption was devised and tested. It was found that a carbon dosage of 1 g/l resulted in pesticide removal in excess of 99.5%; however, a significantly higher dosage (30 g/l) is

required to remove 75% of the total organics. Therefore, it was determined that a two-step carbon-biological process would be required to remove toxic constituents and total organic matter. The treatment facility's performance was studied in detail during its initial period of operation, and it was determined that removal of the pesticides was complete, the average removal of BOD (biochemical oxygen demand) was 97%, and the average removal of COD (chemical oxygen demand) was 85%.

79-0583. DeWalle, F. B.; Chian, E. S. K. (Univ. Washington, Seattle, WA) **Solid wastes and water quality.** *J. Water Pollut. Control Fed.* 50(6): 1277-1286; 1978. (80 references)

A literature review of the effects of landfilled solid wastes on water quality is presented. The environmental impact of landfills was discussed with regard to types of landfills, types of waste deposited, and distribution of nearby groundwater. Attenuation of impact was discussed, along with improved design of landfill collection of wastes. The potential for energy recovery and gas production were outlined and examples of existing programs were listed. A review of the characterization and treatment of wastes was presented, including the handling of hazardous wastes. Some data is available on landfills for pesticide waste disposal.

79-0584. Cripps, D. J.; Peters, H. A.; Gocmen, A. (Univ. Wisconsin, Dep. Med. Div. Dermatol., Madison, WI) **Porphyria turcica: (hexachlorobenzene) intoxication 20 years after.** *J. Invest. Dermatol.* 71(4): 277; 1978.

A site visit was made to eastern Turkey to examine 32 porphyric Turks, average age 29.5 yr, who survived the hexachlorobenzene intoxication which sickened more than 4000 persons during the period from 1956 to 1960. Current examination revealed hyperpigmentation in 53% of the patients, hirsutism (41%), scarring of hands and face (50%), pinched facies and rhagades (22%), fragile skir on hands and face (12.5%), large liver (9%), small hands, sclerodermoid thickening, shortening of distal phalanx and painless arthritis (44%), and enlarged thyroid (38% in a goiter area of less than 5%). Porphyrins were still elevated significantly in 5 subjects. Thus abnormal porphyrin metabolism, distinctive symptomatology and detectable HCB in the tissues were still present 20 years after HCB ingestion.

79-0585. Inami, S. (Dep. Environ. Sanit., Okinawa Prefect. Office, Naha, Okinawa, Japan) **[Occurrence of a mass poisoning due to thallium.]** *Koshu Eisei (Public Hyg.)* 42(7): 465; 1978. (Japanese)

A mass poisoning occurred in three boys(one death and two severe poisonings) and three girls (all slight poisonings). The first victim was a 4-yr-old boy with symptoms of encephalitis who was hospitalized on July 30, 1976. The incident occurred in the central part of Okinawa Prefecture. Thallium was detected in the urine of the patients. It was learned that the family of one victim had purchased a 200 ml bottle of 3% aqueous thallium sulfate as a rodenticide and placed loaves of bread impregnated with the aqueous solution in a warehouse. It was therefore presumed that the children ate the bread without their parents' knowledge.

79-0586. Fitzpatrick, G.; Sutherland, D. J. (Dep. Entomol. & Econ. Zool., Rutgers Univ., New Brunswick, NJ) **Effects of the organophosphorus insecticides temephos (Abate) and chlorpyrifos (Dursban) on populations of the salt-marsh snail *Melampus bidentatus*.** *Mar. Biol.* 46(1): 23-28; 1978. (20 references)

A series of field experiments were conducted to determine the effects of temephos and chlorpyrifos on the salt-marsh snail *Melampus bidentatus*. Toxicants were applied aerially to mosquito breeding areas in New Jersey in the same manner in which they are normally applied for biting-fly control. In response to multiple treatments of a granular formulation of either chemical no significant changes were noted in the population density of *M. bidentatus*. However, on exposure to multiple treatments of a temephos emulsion, a highly significant depression in population density was noted. A resurgence in density levels followed the depression three weeks later. It is suggested that the occurrence of the depression followed by the resurgence may involve some combination of indirect insecticide effects coupled with age-specific effects.

79-0587. Firlik, M. (Phthisol. Clin., Inst. Int. Med., Acad. Med., PL-60-846 Poznan, Poland) **Zmiany w ukladzie oddechowym w zatriciu herbicydem parakwat. [Changes in the respiratory system during paraquat poisoning.]** *Med. Pr.* 29(4): 325-328; 1978. (18 references) (Polish)

Studies on the pulmonary changes caused by paraquat poisoning are reviewed. The degenerative changes seen a few hr after oral poisoning are followed by extensive lung fibrosis in about 2 wk. The absence of damage to the mucosa of the pulmonary capillaries is characteristic. Oxygen therapy of poisoned patients is contraindicated, because oxygen appears to aggravate the pulmonary lesion. Paraquat may cause lung fibrosis through its metabolites formed in other organs, such as the liver. Lung fibrosis is absent in paraquat poisoning due to inhalation.

79-0588. Karam, J. H.; Prosser, P. R.; LeWitt, P. A. (Univ. California, San Francisco, CA 94143) **Islet-cell surface antibodies in a patient with diabetes mellitus after rodenticide ingestion.** *N. Engl. J. Med.* 299(21): 1191; 1978. (6 references)

Two patients with an insulin-deficient ketoacidosis-prone form of diabetes mellitus associated with severe toxic neuropathy resulting from ingestion of a rodenticide, Vacor, are reported. The first patient was a 27-yr-old male who ingested the chemical in 1976 and required insulin for only 10 mo. He now requires sulfonylureas to avoid sustained glucosuria. The second patient was a 32-yr-old male who ingested the rodenticide in July of 1978 and continues to have insulin requiring diabetes and neuropathy. Present knowl-

edge suggests a direct pancreatic beta-cell toxin analogous to alloxan and streptozocin as the nature of this diabetes.

79-0589. Yokoyama, T.; Yanagasawa, T.; Tsugane, S.; Kikuchi, Y.; Taguchi, F. (Saku Gen. Hosp., Usuda, Nagano, Japan) **[Status of application of pesticides for vegetables in highland fields and the health status of farmers applying pesticides to the vegetables.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(2): 203; 1978. (Japanese)

The results of a survey on the health status of farmers (87 male and 65 female) applying pesticides over a period of four months beginning in June 1976 are reported. The total number of applications during the four months was 9268, and the total number of symptoms claimed was 464. The month in which the highest number of applications was recorded was August. The major pesticides were leptophos, captan, methomyl, oxine-copper, zineb, cyanofenphos plus methyl demeton, thiometon and streptomycin. The major symptoms claimed by males were headache, dermatitis, vomiting, and nausea, and by females headache, fatigue, dermatitis, and eye pain. The average number of headaches in men during the application season was one. The average number of slight dermatitis eruptions in women during this period was two. Simultaneous application of many kinds of pesticides predominated. The location of the survey was Kawakami Village in Nagano Prefecture.

79-0590. Nagata, H.; Izumiyama, T.; Kamata, K.; Saito, M.; Takano, S.; Masui, T.; Suzuki, K.; Tajiri, H.; Kurotani, S.; Kobayashi, S.; Yamagishi, M. (Hokushin Gen. Hosp., Nagano, Japan) **[Many-sided survey on pesticide applicators with a multiplicity of pesticides in grape and apple orchards. Part 2.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(2): 203-204; 1978. (Japanese)

As a follow-up to a first study conducted on this subject in 1975, a medical survey was carried out on the same apple and grape growing village. The survey entailed the recording of pesticide applications and of subjective symptoms by the subjects themselves, using a so-called calendar, blood examination, serum chemical examinations, serum ChE assay, and EEGs of speed sprayer operators. The frequency of occurrence of symptoms at the time of application of pesticides (3 or more kinds) was not significantly elevated (compared to 1975). The frequency of nicotine sulfate application was significantly higher in this survey than in 1975. An appreciable depression of serum iron levels in female workers was seen, suggesting overwork and poor nutrition in this group. An appreciable percentage of the subjects had reduced serum ChE. Those subjects whose EEG was abnormal in each of 5 tests did not show any other symptoms during the application of pesticides.

79-0591. Sugaya, H.; Wakatsuki, S. (Inst. Rural Med., Hiraga Gen. Hosp., Hiraga, Akita, Japan) **[Countrywide investigation of clinical cases of pesticide intoxication (collected during 1970 - 1977).]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 436-437; 1978. (Japanese)

Clinical cases of pesticide intoxication including acute poisoning, acute skin, eye and naso-laryngopharyngeal injuries, pesticide allergies, accidental ingestion, suicide, and suspected cases (chronic damage) were collected nationwide every year from Jan. 1 to Dec. 31. The number of cases reported from a total of 217 medical organization during 8 yr beginning in 1970 was 1376 (728 cases in men and 648 cases in women. The age classes of the victims were 373 cases in their forties, 280 cases in their thirties, and 278 cases in their fifties. The months of most frequent occurrence were July, June and August in that order. These three months accounted for 64% of the total cases of poisoning which occurred most frequently during pesticide application (64%). Poisoning was caused in 30% of the cases by organophosphates, 12.5% by herbicides, 10% by organosulfurs, 6% by organochlorines, 5% by carbamates, 3% by antibiotics, and 1% by organomercurials. Acute poisoning accounted for 46% of the cases, skin injuries 0.9 eye injuries naso-laryngopharyngeal injuries 42, 6%, and others 5.6%, respectively. The number of deaths due to pesticide intoxication was 87; 25 were due to paraquat dichloride, 9 to endrin, 5 to EPN, 5 to malathion 3 each due to trichlorfon, fenitrothion and benzoepin (endosulfan), respectively, and 2 each due to nicotine sulfate, dichlorvos, thiometon and fenthion, respectively. Of the intoxications during application 40% were due to insufficient protection, 19% to poor general health, and 5% to improper weather conditions.

79-0592. Matsushita, T.; Nomura, S.; Wakatsuki, S.; Sugaya, H. (Sch. Hyg. Fac. Med., Kagoshima, Univ. Kagoshima, Japan) **[Actual conditions of occurrence of skin injuries due to pesticides according to an analysis of the investigation on clinical cases of pesticide intoxications carried out by the society of rural medicine. Part 1.]** *Nippon Noson Igakka Zasshi (Jpn. J. Rural Med.)* 27(3): 438-439; 1978. (Japanese)

From 1967 to 1975 (excluding 1969), the total number of reported uses of pesticide induced illnesses was 1404. The number of persons with skin injuries due to pesticides was 711 (50.6% of the total of 1404). Skin injuries were most frequent in 1972 (66.7%) and least frequent in 1968 (42.7%). Out of the total number of cases (1404), the largest number of skin injuries was due to organosulfur pesticides, followed by herbicides, then by organomercurials, and then by antibiotics. It was found from an analysis of questionnaires filled out by the victims that the season of principal occurrence of skin injuries was summer (87.6% from May to Sept.). The causal pesticide of skin impairments was captafol (64 cases), organosulfur (44 cases), high toxicity organophosphates (38 cases), and organochlorine (32 cases). The main sites of injury were face (94%), neck and forehead (by captafol), and neck, forehead, face and forearm (by organosulfurs). Injuries to covered areas such as abdomen, back, and upper arms due to organosulfurs were surpisingly frequent. Inadequate protection, carelessness of applications, improper methods of application, unsuitable weather conditions and the use of dangerous pesticides per se were the major causes of skin injuries during application of pesticides.

79-0593. Kusunoki, F.; Kumura, Y.; Maguri, M. (Engaru Kosei Hosp. Engaru, Hokkaido, Japan) **[Results of investigation of pesticide intoxications in Engaru district of Hokkaido.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 440-441; 1978. (Japanese)

An investigation was conducted on intoxications due to pesticides among farmers working in apple orchards and onion fields in Kamiwakubetsu-cho, Engaru district, Hokkaido Japan. The following subjective symptoms were commonly reported: roughness of hands and legs (36.8%), redness of skin (36.1%), eye pain (23.6%), loss of appetite (22.9%) and headache (19.4%). In medical examinations of these farmers, reduction of cholinesterase activity was observed in a large number of cases (46.7% slight reduction Δ-pH 0.60-0.75). Pesticides were applied at least 16 times between late March and early September in onion fields and at least 14 times in apple orchards between April and November. A total of 42 types of pesticides were used in the onion fields and 32 in the apple orchards.

79-0594. Nagata, H.; Izumiyama, T.; Takano, S.; Kamata, K.; Masui, T.; Suzuki, H.; Kobayashi, S.; Yamagishi, M. (Hokushin Gen. Hosp. Nagano, Japan) **[Results of health examination on pesticide applicators in grape and apple growing district. Part III.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 442-443; 1978. (Japanese)

The health status of farmers engaged in pesticide application in the grape and apple growing district was investigated on self-using record kept by the farmers in 1975, 1976 and 1977. The subjects were 18 speed-sprayer (SS) operators, 19 male farmers and 15 female farmers. The rate of occurrence of poisoning was greatest in SS operators, and the most frequent symptom was headache. Some symptoms were recorded in these years during the application of salithion, nicotine sulfate, diazinon, chlordimeform, fenitrothion, cyanophos, vamidothion, cyanofenphos, chlorpyrifos, bromopropylate, thiophanate-methyl, mancozeb, polyoxins, inorganic sulfur, ziram plus bis (dimethyldithio carbamoyl) ethylenebis (hydroxylsulfamine), polyoxin plus captan, benomyl, thiophanate, and thiram plus ziram. Those pesticides for which the numbers of applications were large compared to the frequency of symptoms were nicotine sulfate, chlorpyrifos and chlordimeform (insecticides and polynox (composition not certain), thiram plus ziram, and thiophanate-methyl fungicides. As protective means, the use of masks, caps, coats and gloves showed an increase from 1975 to 1977; however, in many cases the chest and neck were not covered during application of pesticides.

79-0595. Usutani, S.; Nishiyama, K.; Kida, K.; Takamatsu, Y. (Sch. Public Health, Fac. Med., Hirosaki Univ., Hirosaki, Aomori, Japan) **[Results of health examination of operators of speed sprayers.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 444-445; 1978. (Japanese)

Results of medical examinations carried out on 140 (1977) and 78 (1978) pesticide speed sprayer operators in April (before commencing operations) are reported. The percentages of operators claiming subjective symptoms such as gastrointestinal disorders, lumbago and hemorrhoids were 23, 11 and 7. The percentages of operators showing abnormal data in urinalysis (sugar, protein and urobilinogen respectively) were 3.7, 7.8 and 4.1. The percentages of abnormal data in blood analysis (anemia, GOT, alkaline phosphatase and cholinesterase) were 6.9, 3.2, 7.3 and 18.8, respectively. The percentages of abnormal findings on such factors as obesity, one second rate, auditory power, blood pressure and electrocardiogram were 14.1, 2.3, 25.7, 8.7, and 5.1. Examinations of lvier functions were carried out every month on the operators of speed sprayers, and some relationship was found between the liver function and the season of employment.

79-0596. Tsugane, S.; Hirabayashi, H.; Tajima, J.; Yokoyama, T.; Tsugane, Y.; Sakurai, K.; Nakamura, S.; Ide, H.; Asanuma, S. (Saku Gen. Hosp. Usuda, Nagano, Japan) **[Actual status of pesticide application and health management of pesticide applicators in vegetable-growing highlands.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 446-447; 1978. (Japanese)

Results of medical examinations carried out on 87 men and 59 women for 3 mo, from July to September 1977, in the vegetable growing highlands of Nagano Prefecture were reported. Pesticide application was most frequent in August (7.7/mo/man and 5.2 mo/woman). The occurrence of subjective symptoms was most frequent in July, followed by August and September. The total number of times of pesticide application was 1,176 for organophosphates, 1,069 for organosulfurs, 463 for copper compounds, 305 for antibiotics and 191 for carbamates, respectively. Frequently occurring symptoms included headache, rash, nausea, pain and redness of eyes. These incidents were due to carlessness of the applications, unsuitable weather, insufficient protection and other causes. The frequency of occurrence of symptoms was largest when 5 or more kinds of pesticides were applied simultaneously.

79-0597. Horiuchi, N.; Ando, S.; Suzuki, A. (Saku Gen. Hosp., Usuda, Nagano, Japan) **[Photo-sensitization due to pesticides.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 450-451; 1978. (Japanese)

In the occurrence of dermatitis due to pesticides, primary irritation, contact allergy and photosensitization are considered as the principal mechanisms. Of 88 patients examined at the author's hospital for dermatitis due to pesticides, photodermatosis was diagnosed in 15 (17%). Patch tests on the 15 patients were positive in 44.4% for salithion, 40.0% for cyanophos, 38.9% for dichlorvos, 30.0% for maneb, and 28.8% for chlorothalonil. However, there were many cases wherein the causative pesticide of the dermatitis could not be deduced from the patch test result of a single pesticide. It is assumed that the pesticide may act as a photosensitizing agent to cause solar dermatitis, an unusual photosensitive dermatitis. A test was carried out in which 24 hr after applying pesticides the skin was irradiated with light from xenon lamp at half the minimum erythemal dose and the result was

observed after 24 hr. The highest percentage of positive results in the photopatch test were obtained for paraquat (21.2%), followed by chlorothalonil (19.2%) and dichlorvos (15.2%).

79-0598. Arimatsu, T.; Kesado, K. (Sch. Public Health, Fac. Med., Kumamoto Univ., Kumamoto, Japan) **[Intoxication due to hydrogen sulfide during the application of a mixture of lime-sulfur and primary calcium phoshate.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 452-453; 1978. (Japanese)

A female farmer, age 34 yr, while examining a mixing tank which contained 15.12 l of lime-suflur (calcium polysulfides) and 3 kg of primary calcium phosphate in 1,260 kl of water without wearing a mask, became unconsious suddenly and then was hospitalized. She was diagnosed as having intoxication due to hydrogen sulfide with symptoms of unconsiousness and vomiting (+ + +), without convulsions or abnormal findings on examination other than leucocytosis (WBC 14,800). She recovered consciousness 4 hr after the occurrence of intoxication; however, nausea and vomiting continued for about 4 days, after which she was discharged. Calculation indicated that 231.2 g of hydrogen sulfide would have evolved from the mixture, and the atmosphere she inhaled contained about 5,000 ppm of H_2S. It has been stated that hydrogen sulfide is odorless at very high concentration. Since this woman did not known that hydrogen sulfide is generated when lime sulfur is mixed with primary calcium phosphate, she examined the interior of the tank without putting on a mask.

79-0599. Narita, S.; Motojuku, H.; Sato, J.; Mori, H. (Funita Gen. Hosp., Fujita, Fukushima, Japan) **[Autopsy in acute suicidal poisoning with diquat dibromide.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 454-455; 1978. (Japanese)

A highly unusual case of poisoning by diquat dibromide is reported. A 33-yr-old clerk after drinking heavily, swallowed about 200 ml of a 30% aqueous solution of diquat dibromide and was hospital because of frequent vomiting. He was conscious, but had great thirst, severe irritation of the oral cavity, and diarrhea, with a temperature of 39°C. He was treated with gastric irrigation and replacement infusion, and was given Adsorbin (250 ml of 30% Adsorbin every 3 hr). He became anuric 24 hr after poison ingestion, and a diuretic was ineffective. He was transferred to the authors' hospital for treatment of acute renal insufficiency. He was practically comatose, with inarticulate speech, meiosis, and unclear light reflexes. Hemodialysis was started within an hour after hospitalization. However, he died in dyspnea, at a total time after intoxication of 38 hr and 30 min. Autopsy revealed general necrosis of renal tubules with relatively normal glomeruli. A large amount of diquat dibromide was detected in liver, kidney and lung specimens. Numerous punctate hemorrhages were seen in the lungs. Many hemorrhagic ulcers and erosions were present in the stomach. Hemorrhages were also seen in the retroperitoneal lymph nodes. Severe congestion was seen in lungs, liver, stomach, small intestine and adrenals. The affinity of diquat dibromide for the organs is somewhat different from that of paraquat dichloride. Since poisoning with diquat dibromide is so dangerous, it is hoped that the conditions of sale and storage of diquat dibromide will be rapidly improved and that a suitable treatment plan will be developed for poisoning by this pesticide.

79-0600. Starvou, A.; Butcher, R.; Sakula, A. (Redhill Gen. Hosp., Surrey, England) **Accidental self-poisoning by sodium chlorate weed-killer.** *Practitioner* 221(1323): 397-399; 1978. (5 references)

A 13-yr-old boy tested white crystals which spilled from a bag kept in a shed on his father's farm. The crystals were sodium chlorate, a weed-killer. Six hours later the boy was extremely ill with rigors, abdominal pain, vomiting and diarrhea. The urine was dark with blood clots. The family doctor gave a provisional diagnosis of infectious hepatitis. Three days later he was hospitalized in a greatly deteriorated conditions. Renal failure was present and was treated by peritoneal dialysis and supportive measures. Transfusions of 6 units of blood were given. Subsequently the renal function recovered and serum enzymes slowly returned to normal. The extremely poisonous nature of sodium chlorate cannot be overstated.

79-0601. McClure, C. D. (Madera Cty, Health Dep. Madera, CA 93637) **Public health conerns in the exposure of grape pickers to high pesticide residues in Madera County, Calif., September 1976.** *Public Health Rep.* 93(5): 421-425; 1978. (3 references)

A total of 108 of a crew of 120 grape pickers became ill with symptoms suggesting pesticide poisoning on September 8 and 9 after harvesting grapes in one owner's fields. Investigation revealed that during the first 2 wk of harvesting the pickers were exposed to residues of dimethoate, methomyl, Omite (propargite), Torak (dialifor), and Zolone (phosalone). All of these compounds, except for Omite, are cholinesterase inhibitors. Workers were exposed to foliage containing up to 57 ppm Zolone and up to 2.3 ppm Zolone oxon. The estimated concentration of Torak in the fields was 100 ppm, a highly significant exposure level. The growers' records of application date and amounts applied contained no indication that these residues could have been possible at the time of harvesting. A criminal complaint was filed against the grower. He was fined $1750 for violations which included the use of Torak without a valid permit and not maintaining a record of such use. A physician was also fined in this action for failure to report occupational injury to the Division of Labor Statistics and Research.

79-0602. Stalberg, E.; Hilton-Brown, P.; Kolmodin-Hedman, B.; Holmstedt, B.; Augustinsson, K. B. (Dep. Clin. Neurophysiol., Univ. Hosp., Uppsala, Sweden) **Effect of occupational exposure to organophosphorus insecticides on neuromuscular function.** *Scand. J. Work Environ. Health* 4(3): 255-261; 1978. (20 references)

Blood samples from 11 spraymen working daily with solutions of 4% lindane, 0.2% pyrethrum, 0.125% piperonyl butoxide, 2.5% malathion, or 2% bromophos in kerosene were examined for cholinesterase activity. Neurophysiological investigations were also made. None of the subjects had clinical symptoms of intoxication apart from occasional headaches which were sometimes related to work. Cholinesterase activity levels were all within the normal range. Only one subject had a decrease in plasma activity exceeding the normal intraindividual variation. Nerve conduction studies showed that the motor nerve conduction velocity was above the lower normal limits in all workers. No decremental response and no postactivity facilitation or exhaustion was noted in any of the workers. Some individual motor end-plates showed increased jitter before or after exposure, but no consistent variation in the jitter with exposure was found. No correlation was found between cholinesterase activities in plasma or red cells and the neurophysiological parameters examined.

79-0603. Kusakabe, K.; Negishi, K.; Oguri, M. (Fac. Med., Gunma Univ., Maebashi, Gunma, Japan) **[A case of infantile intoxication due to organophosphorus pesticide, to which PAM and atropine were effectual.]** *Shonika Shinryo (J. Pediatr. Pract.)* 41(12): 102-103; 1978. (Japanese)

A rare case of accidental infantile acute intoxication by an organophosphorus insecticide was reported. A 1.5-yr-old girl showed symptoms of vomiting, lethargy, pale face, miosis, absence of light reflex, coma, and absence of tendon reflex, but no salivation, myofibrilar contracture, nor spasm within 20 min. after swallowing the insecticide. Serum cholinesterase activity at the time of hospitalization was 0.2 Δ -pH (recovered to 0.9 Δ-pH on the 26th day of illness). Fast waves appeared in the EEG on the 6th day of illness and disappeared after 1 mo. The treatment with a large dose of PAM (2.6 g) and atropine (0.8 mg) was carried out using miosis as an index. A transient aggravation was observed which was attributed to Trichlor used in EEG examination.

79-0604. Mukada, T.; Sasano, N.; Sato, K. (Second Dep. Pathol., Tohoku Univ. Sch. Med., Sendai, Japan) **Autopsy findings in a case of acute paraquat poisoning with extensive cerebral purpura.** *Tohoku J. Exp. Med.* 125(3): 253-263; 1978. (17 references)

A 44-yr-old male ingested paraquat accidentally, about 2 to 3 ml or a 20% concentrated solution. On the fifth day of intoxication he was admitted to a hospital for nausea, dysphagia, jaundice, and oliguria. Dyspnea, marked irritability, and restlessness appeared. Peritoneal dialysis was not successful. The patient died on the 6th day after ingestion after oxygen inhalation for 20 hr. Autopsy findings showed characteristic features in the lungs of paraquat poisoning. Striking hemorrhagic leukoencephalopathy was present throughout the central nervous system which involved almost exclusively the white matter. Focal hemorrhage was present at various stages and were accompanied by demyelineating processes at varying extent.

79-0605. Mosekilde, L.; Pallisgaard, G. (Lungemed. Afd. L, Odense Sygehus, Odense, Denmark) **Alveolitis fibrosa. En eksogent betinget sygdom? [Fibrosing alveolitis. An exogenically determined syndrome?]** *Ugeskr. Laeg.* 140(37): 2239-2243; 1978. (18 references) (Danish)

Cryptogenic fibrosing alveolitis was diagnosed in 5 women (average age 54 yr) and in 13 men (average age 55 yr) without known or recognized exogenous causes. The symptoms included dyspnea, dry basal crepitation, radiologically verified bilateral fibrosis, and restrictive pulmonary distress. The inhalation of pesticide spray was suspected as an exogenous cause of the fibrosing alveolitis in 7 cases. These seven patients included farm workers, fruit growers and packers, and a veterinarian.

79-0606. Munro, I. B.; Ostler, D. C.; Machin, A. F.; Quick, M. P. (Vet. Invest. Cent., Coley Park, Reading, England.) **Suspected poisoning by pentachlorophenol in sawdust.** *Vet. Rec.* 101: 525-526; 1978. (7 references)

The deaths of 11 cats during a one year period at a cattery maintaining 80 breeding females caused suspicion of possible poisoning. With the exception of one cat, all died suddenly. The most consistent macroscopic lesions were found in eight cases as enlargement of the kidneys with pale, yellow cortices, together with liver degeneration. Blood clotting was absent resulting in profuse hemorrhage into either the abdominal or thoracic cavity. Extensive vacuolation of the tubular epithelium of the kidneys was found consistently with consequent fibrosis in some cases Samples of sawdust and shavings from the bedding material for the cats showed evidence of varying amounts of PCP. PCP was also identified in the intestinal contents of a 3-wk-old kitten and in both the liver and stomach contents of a 6-mo-old cat. Thus sawdust from wood treated with PCP may be a hazard, particularly for cats as they groom themselves by licking.

79-0607. Andres, D. R. (Author address not given) **Managing hazardous wastes.** *Waste Age* 9(10): 32, 34-36; 1978.

Potential benefits to be gained from landspreading sludge, as well as environmental concerns associated with improper management are reviewed. Potential benefits are both environmental and economic. The productivity of the land is increased by this process by returning organic matter to the soil along with nitrogen, phosphorus, potassium, and certain essential trace elements. Dramatic increases have been noted in several recent studies from the proper application of suitably digested sludge. However, without proper management, landspreading may pose difficult environmental problems by causing a potential threat to the food chain through the entry of toxic elements and compounds into the diet such as heavy metals, cadmium, pathogens, pesticides, and persistent organics. In the area of pesticides the major concern is over chlorinated biphenyls and insecticides such as DDT, aldrin, dieldrin, and chlordane. PCB's and pesticides have been detected in sludge in small quantities. Landspreading of sludge on agricultural land is one way for toxic and potentially carcinogenic chlorinated hydrocarbons to be introduced into the food chain.

79-0608. Peoples, S. A.; Maddy, K. T. (Work. Health & Saf. Unit, Calif. Dep. Food & Agric., Sacramento, CA) **Organophosphate pesticide poisoning.** *West. J. Med.* 129(4): 273-277; 1978.

Out of a crew of 120 persons assigned to pick grapes, 118 became ill during the early part of September of 1976. Eighty-five of the workers were given medical attention and three of these 85 were admitted to hospitals. Symptoms suggested organophosphate poisoning. The average plasma and red cell cholinesterase values were depressed more than 60%. Atropine was used as treatment in most cases; some patients were also treated with 2-PAM. The incident was caused by exposure to organophosphate pesticides dialifor and phosphalone in the vineyards of one grower's land near Madera, California. Workers had been allowed to enter the fields before the required 30 day waiting period after using these chemicals. Excessive skin exposure to the chemicals had resulted in their illnesses. The grower paid substantial medical expenses, a fine for violating state regulations, and also lost heavily in grapes which were under quarantine.

79-0609. Zelger, J. (Dermatol. Abt. Landeskrankenanst., A-5020 Salzburg, Austria.) **Berufsdermatosen. [Occupational dermatoses.]** *Wien. Med. Wochenschr.* 128(15): 452-494; 1978. (German)

Occupational dermatoses are due primarily to contact with mechanical, physical and chemical noxae such as metals, rubber, plastics, dyes, varnishes, solvents, oil products, drugs, disinfectants, pesticides, and plants. In addition, occupational skin infections and skin cancers also exist. Mechanically caused dermatoses are, for example, "white fingers" due to vascular spasm resulting from vibrating machinery. Physically induced dermatoses are due to heat, humidity, ionizing radiation, lasers, and radioactive isotopes. Chemical dermatoses are caused by precipitation, oxidation, hydrolysis, hygroscopy, lipolysis, and keratolysis. While minimizing exposure and eliminating susceptible individuals is the best prevention, special precaution is called for in introducing new materials, especially since there is no reliable method of testing the sensitivization potential of a substance. Sometimes comparison of the chemical structure of a new material with known allergens can offer a clue to its sensitivizing potential. The danger of dermatoses can be reduced by appropriate precautionary measures involving machine construction, plant layout, instruction of workers, and cooperation of plant management with a dermatologist.

79-0610. Kumagaya, S.; Matayoshi, Y.; Nagai, K. (Dep. Narc., Kurashiki Cent. Hosp., Kurashiki, Okayama, Japan) **[Pesticide intoxication.]** *Yamaguchi Igaku (Yamaguchi Med. J.)* 27(2): 211; 1978. (Japanese)

Four cases of pesticide poisoning due to swallowing of malathion plus thiometon (2 cases), or parathion and methomyl were reported. The general symptoms of all cases were loss of consciousness, respiratory failure, miosis, myofibrillary twitching, increase of airway secretions, and reduction of serum cholinesterase activity. Loss of consciousness was restored within 24 hr. Treatment of the patients consisted of artificial respiration and administration of atropine to methomyl-intoxication, and of atropine plus PAM to organophosphorus-intoxication. The recovery of the reduced activity of serum cholinesterase due to methomyl was faster than recovery of decreased cholinesterase activity due to organophosphorus pesticide. There was no relationship between the value of serum cholinesterase and the clinical symptoms. Complications of pulmonary edema, hepatitis and polyneuritis was also observed.

79-0611. Hanusch, A.; Hanusch, A. (Inn. Fachabt., DDR-798 Finsterwalde/NL, DDR) **Zur Untersuchung PSM-Exponierter. [Investigation of subjects exposed to plant-protecting agents.]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 24(7): 544-547; 1978. (22 references) (German)

The results of laboratory investigations of 86 adults who had been exposed to plant-protecting agents occupationally, and of 100 unexposed control subjects were presented. The length of exposure was up to 5 yr in 40 cases, 5-10 yr in 27, and over 10 yr in 19. The transaminase, and thymol turbidity tests showed pathological findings in over 50% of the exposed persons and controls alike, whose daily alcohol consumption did not exceed 50 g. The serum cholinesterase level was pathological in 20% of the exposed subjects. Liver biopsy, performed in 25 exposed subjects, revealed definite fatty degeneration of the liver. The etiology of this change is uncertain due to the possible interplay of other factors (alcohol, faulty eating habits). No correlation was found between the length of exposure and pathological data.

See also 79-0508, 79-0514, 79-0533, 79-0552, 79-0554, 79-0555 *and* 79-0556.

79-0612. Thigpen, J. E.; McConnell, E. E.; Moore, J. A. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC 27709) **The effects of low levels of 2,3,7,8-terachlorodibenzo- *p*-dioxin (TCDD) on mouse peritoneal exudate (PE) cell number, cell viability, differential cell count and on macrophage phagocytic function.** *Abstr. Annu. Meet. Am. Soc. Microbiol.* 78: 18; 1978.

Mice were exposed to TCDD at 5 μg/kg weekly for a 4 wk period. The peritoneal exudate cell number was decreased, and differential cell counts showed a significant reduction in observed numbers of both macrophages and lymphocytes. The leukocytic differential counts of heart blood showed no significant changes. The cumulative uptake of *Salmonella bern* by PE macrophages from mice exposed to TCDD was significantly reduced only at 1 hr after the addition of bacteria. No significant differences were noted in macrophage bactericidal ability. Therefore it is apparent that subclinical levels of TCDD exert a bustle, yet definite effect on the phagocytic defense system of the mouse by restricting the movement of mononuclear phagocytes and lymphocytes into thioglycolate-induced peritoneal exudates or by inhibiting the formation of these cells. (Abstract No. B30)

79-0613. Bajgar, J.; Fusek, J.; Patocka, J. (Purkyne Med. Res. Inst., Hradec Kralove, Czechoslovakia) **Toxicities and the rates of penetration of *O*-ethyl-*S*- (2-dimethylaminoethyl)- methylphosphonothioate into the blood following different routes of intoxication.** *Acta Biol. Med. Germ.* 37(4): 633-636; 1978. (7 references)

Female Wistar rats were dosed with EDMM, a highly toxic organophosphate, at levels of 0.1 ml/kg via im, ip, iv, and po routes, for toxicity studies. Toxicities of the compound by these routes were determined to be 17.0 μg/kg (iv), 23.6 μg/kg (im), 54.5 μg/kg (ip), and 121.9 μg/kg (po). When the compound was given at the dose level of 42 μg/kg through these routes of administration, acetylcholinesterase activity in the blood was monitored. It was concluded that only a part of the dose administered is effective in inhibiting acetylcholinesterase in the blood. Thus effective levels of dosing are practically identical for all routes of adminisration. The various median lethal values could be caused by losses of EDMM during its passage through various biological barriers.

79-0614. Mahmood, A.; Agarwal, N.; Sanyal, S.; Subrahmanyam, D. (Dep. Biochem., Postgrad. Inst. Med. Educ. Res., Chandigarh 160011, India) **Effects of DDT (chlorophenotane) (sic) administration on glucose uptake and brush border enzymes in monkey intestine.** *Acta Pharmacol. Toxicol.* 43(2): 99-102; 1978. (23 references)

Rhesus monkeys were given DDT (chlorophenothane) mixed with corn oil by stomach tube at a dose of 150 mg/kg. At 48 hr after DDT administration, animals were fasted for 12 hr and then sacrificed after an intravenous injection of nembutal (30 mg/kg). The uptake of D-glucose by monkey intestinal segments was significantly increased after DDT treatment. Addition of the drug to the reaction mixture, however, did not influence the sugar absorption, which suggests that the activating effect of DDT on the sugar uptake process occurs at the metabolic level. Sucrase activity showed a two-fold stimulation, while lactase activity was increased 4 times in DDT treated animals. Alkaline phosphatase activity was not changed. Clinical symptoms of DDT intoxication closely resembled those in diabetes.

79-0615. Rabloczky, G.; Mader, M. R. (Dep. Exp. Toxicol., Natl. Inst. Occup. Health, Budapest, Hungary) **Effects on blood pressure of the anticholinesterases physostigmine and mevinphos in course of development in chickens.** *Acta Physiol. Acad. Sci. Hung.* 50(4): 437-446; 1977. (21 references)

Leghorn hybrid chickens and hens were injected iv with a dose of physostigmine or mevinphos. The doses used were 25, 50, or 100 μg/kg physostigmine, or 50, 100, or 200 μg/kg mevinphos. Three doses of one of the anticholinesterases were injected before and after an intravenous injection of atropine (1 mg/kg), with successive injections being given at intervals of 15 to 20 minutes. The compounds reduced blood pressure in the newly-hatched chickens. This effect gradually changed during the development of the chicken, and in hens a pressor effect was noted. Atropine did not influence the fall in blood pressure. However, the pressor effect was attenuated, though not abolished, by atropine.

79-0616. Romanowski, H. (Dep. Chem. Toxicol., Inst. Pharm. Anal. Technol., Acad. Med., Lublin, Poland) **Wplyw DDT na resorpcje i wydalanie chlorku chlorocholiny (CCC) u szczurow. [Effect of DDT on the absorption and excretion of chlorocholine chloride (CCC) in rats.]** *Ann. Univ. Mariae Curie Sklodowska, Sect. D.* 31(38): 299-305; 1976. (11 references) (Polish)

The effect of DDT on the gastric resorption and excretion of chlorocholine chloride (chlormequat chloride; CCC; 0.05 and 0.1 g/kg) was studied in Wistar rats. DDT was administered in doses of 0.04 g/kg/day for 7 days prior to CCC. The substances were administered by stomach tube. DDT had no effect on the overall times necessary for gastric resorption (3 hr) and urinary excretion (about 32 hr) of CCC. However, it reduced the resorption fraction at 0.5 and 2 hr, and reduced the urinary excretion rate at 4 and 24 hr (following the administration of 0.05 g/kg CCC) and at 24 hr (following the administration of 0.1 mg/kg CCC).

79-0617. Romanowski, H. (Dep. Chem. Toxicol., Inst. Pharm. Anal. Technol., Acad. Med., Lublin Poland) **Wplyw kwasu 2,4-dwuchlorofenoksyoctowego (2,4-D) na resorpcje i wydalanie chlorku chlorocholiny (CCC) u szczurow. [Effect of 2,4-dichlorophenoxyacetic acid (2,4-D) on the absorption and excretion of chlorocholine chloride (CCC) in rats.]** *Ann. Univ. Mariae Curie Sklodowska Sect. D* 31(43): 333-338; 1976. (14 references) (Polish)

The effects of 2,4-D (0.06 and 0.12 g/kg, given intragastrically) on the gastric resorption and excretion of chlo-

rocholine chloride (chlormequat chloride, CCC) was studied in Wistar rats. CCC was given in doses of 0.05 and 0.1 g/kg. The time necessary for the practically complete gastric resorption of CCC from the stomach was reduced by 2,4-D from 3 to 2 hr. The urinary excretion of CCC was completed in 32 hr with and without 2,4-D, but 2,4-D intensified the excretion process significantly. No CCC was found in fecal samples collected 4-32 hr after poisoning.

79-0618. Gorski, M.; Piotrowska, A. (Dep. Embryol., Univ. Marie Curie- Sklodowska, Lubin, Poland) **Wplyw *O,O*-dwumetylo- 2,2,2-trojchloro- 1-hydroksyetylo- fosfonianu (foschloru) na aktywnosc mitotyczna komorek L *in vitro*. [Effect of *O,O*-dimethyl 2,2,2-trichloro- 1-hydroxyethyl phosphonate (foschlor) on the mitotic activity of L-cells *in vitro*.]** *Ann. Univ. Mariae Curie Sklodowska, Sect. D* 31(44): 339-343; 1976. (12 references) (Polish)

The effect of foschlor (trichlorfon) at 0.03-30 μg/ml, freshly prepared or incubated for 24 hr at 37°C, on the mitotic activity of L-cells was studied. With fresh trichlorfon, the mitotic index (MI) was 54.6 at 0.30 μg/ml and 28.9 at 30 μg/ml, versus 57.3 in the controls. The stathmotic index (SI), determined with colchicine, was 72.2 at 0.3 μg/ml and 27.8 at 30 μg/ml, versus 87.8 in the controls. The mean mitotic time (MMT) was 90.6 min at 0.3 μg/ml and 124.2 min at 30 μg/ml, versus 78 min in the controls. The generation time (GT) was 27.6 hr at 0.3 μg/ml and 71.6 hr at 30 μg/ml, versus 22.7 hr in the controls. With incubated trichlorfon, the MI was 47.3 at 0.3 μg/ml and 18.6 at 30 μg/ml; the SI was 66.6 at 0.3 μg/ml and 22 at 30 μg/ml. The MMT was 85.2 at 0.3 μg/ml and 101.4 at 30 μg/ml, versus 73.8 min in the controls. The GT was 30 hr at 0.3 μg/ml and 90.9 hr at 30 μg/ml, versus 24 hr in the controls.

79-0619. Gorski, M.; Grzybek, D. (Dep. Embryol., Univ. Marie Curie-Sklodowska, Lublin, Poland) **Wplyw trypsynowania oraz zmiany plynu hodowlanego na przezycie hodowli tkankowych zatrutych zwiazkami fosforoorganicznymi. [Effect of trypsinzation and changing the nutrient medium on the survival of tissue cultures poisoned with organophosphorus compounds.]** *Ann. Univ. Mariae Curie Sklodowska Sect. D* 31(45): 345-348; 1976. (6 references) (Polish)

The effect of trypsinization and of changing the nutrient medium on the survival of 360 HeLa and monkey kidney cultures, incubated in the presence of DFP (30-120 μg/ml) and dipterex (trichlorfon) (30-120 μg/ml), was studied. The cultures were trypsinized or the nutrient medium changed after 24-hr incubaton with the pesticides. In cultures incubated with 30 and 60 μg/ml concentrations of the pesticides, trypsinization and/or changing the culture medium diminished the cell damage considerably. Only isolated cells survived in the cultures incubated with 120 μg/ml, despite trypsinization and replacing the culture medium. Even though DFP is 100 times more toxic than dipterex *in vivo*, their *in vitro* cytotoxic effect was the same. The findings indicate that the metabolites of organophosphorus compounds are also cytotoxic.

79-0620. Cook, A. M.; Daughton, C. G.; Alexander, M. (Lab. Soil Microbiol., Dep. Agron., Cornell Univ., Ithaca, NY 14853) **Phosphorus-containing pesticide breakdown products: quantitative utilization as phosphorus sources by bacteria.** *Appl. Environ. Microbiol.* 36(5): 668-672; 1978. (22 references)

Bacteria were isolated that could isolate representatives of the following ionic phosphorus containing breakdown products of organophosphorus pesticides as sole phosphorus sources: dialkyl phosphates, dialkyl phosphorothioates, dialkyl phosphorodithioates, alkyl arylphosphonates, alkyl arylphosphonothioates, and alkyl alkylphosphonates. Utilization of each organophosphorus compound, which was complete for 7 of 12 compounds studied, was confirmed by determination of protein yield from the amount of phosphorus source consumed. This is the first report of the utilization of an ionic dialkyl thiophosphate or dithiophosphate by microorganisms. (Author abstract by permission)

79-0621. Holmstedt, B.; Nordgren, I.; Sandoz, M.; Sundwall, A. (Dep. Toxicol., Swedish Med. Res. Council, Karolinwska Inst., S-104 01 Stockholm, Sweden) **Metrifonate: summary of toxicological and pharmacological information available.** *Arch. Toxicol.* 41(1): 3-29; 1978. (112 references)

The organophosphorus compound *O,O*-dimethyl-(1-hydroxy-2,2,2-trichloroethyl)- phosphonate was introduced as an insecticide, trichlorfon, in 1952 and as a drug, metrifonate, in the treatment of schistosomiasis in 1960. This organophosphorus compound is unique in that it has been claimed not to be a direct acting cholinesterase inhibitor but being transformed nonenzymatically into an active component dichlorvos, 2,2-dichlorivnyl dimethyl phosphate (DDVP). The evidence for this transformation has mostly been indirect. Recently it has been proved chemically and quantitatively that this transformation occurs in the animal body. Metrifonate is the sole organophosphorus compound currently studied clinically in schistosomiasis. A substantial therapeutic effect is obtained only in *Schistosoma haematobium* infections. In this review on available data of metrifonate it is suggested that further more detailed studies of both *S. haematobium* and *S. mansoni* are necessary. This should include studies of the enzymic properties of the worms and the reaction of their esterases towards both metrifonate and DDVP as well as the pharmacokinetics of these compounds in man. In addition there are still unsolved discrepancies reported regarding organ toxicity of the compound which may, however, be due to different grades of parity of the test material. (Author abstract by permission)

79-0622. Nordgren, I.; Bergstrom, N.; Holmstedt, B.; Sandoz, M. (Dep. Toxicol., Swed. Med. Res. Council, Karolinska Inst., S-104 01 Stockholm, Sweden) **Transformation and action of metrifonate.** *Arch. Toxicol.* 41(1): 31-41; 1978. (43 references)

Chemical formation of dichlorvos (2,2-dichlorovinyl dimethyl phosphate) was found to occur in mouse brain after ip injection of metrifonate (trichlorfon, 2,2,2-trichloro-

1-hydroxyethyl dimethyl phosphonate). A mass fragmentographic technique was used. Different isotopic variants were used both as internal standards and to compensate for dichlorovs formed during the workup procedure. The dichlorvos formed in vivo was found to have its maximal concentration a few minutes after the maximum of the metrifonate itself. The effect of metrifonate and dichlorvos on acetylcholine levels, acetylcholinesterase activity and synthesis rate of acetylcholine in mouse brain was also studied. In all three cases the effect of metrifonate was found to be prolonged and delayed as compared to the effect of dichlorvos. It is concluded that metrifonate acts as a slow release formulation in the body, giving rise to dichlorvos nonenzymatically. This circumstance at least partly explains its efficacy in the treatment of schistosomiasis. (Author abstract by permission)

79-0623. Mourik, J.; De Jong, L. P. A. (Prins Maurits Lab., TNO, Chem. Res., Rijswijk, The Netherlands) **Binding of the organophosphates parathion and paraoxon to bovine and human serum albumin.** *Arch. Toxicol.* 41(1): 43-48; 1978. (12 references)

Binding of parathion and paraoxon to bovine serum albumin (BSA) and human serum albumin (HSA) was studied by using equilibrium dialysis. The concentration of unbound organophosphate was determined from its anticholinesterase activity. Binding of parathion to BSA was shown to be reversible. The organophosphates interact with only one type of binding sites in BSA and HSA. The affinity constants at pH 7.2 and 4°C for the interaction of BSA or HSA and parathion were found to be 2.7 million and 1.5 million per mole, respectively. The affinity constants for the interaction of the serum albumins and paraoxon were considerably lower, 6.0 thousand and 16. thousand per mole, respectively. Lowering the pH from 7.2 to 4.8 did not significantly affect the binding parameters. The great difference of affinity of the serum albumins to parathion and paraoxon is discussed with respect to the fate of parathion in the body. (Author abstract by permission)

79-0624. Kullmann, R.; Uerdingen, U. (Pharmakol. Inst., Rheinschen Friedrich Wilhelms Univ., D-5300 Bonn 1, BRD) **Regional pre- and postganglionic sympathetic activity during experimental paraoxon poisoning.** *Arch. Toxicol.* 41(1): 49-60; 1978. (34 references)

The effect of 0.4 or 0.8 mg paraoxon/kg iv on circulation and regional pre- and postganglionic sympathetic activity were studied in anaesthetized rabbits. At both doses, the discharges of the preganglionic efferents increased slowly, whereas the changes in activity of postganglionic efferents differed. Concomitantly with a transient initial rise in blood pressure a temporary increase of discharges to the skeletal muscles and to the intestine was observed which is attributed to spontaneous firing of the regional ganglionic cells. After injection of 0.4 mg/kg there occasionally occurred a second pressor reaction conditioned by enhancement of preganglionic activity and facilitated transmission in certain sympathetic ganglia. After infecion of the higher dose, postganglionic activity generally decreased except for the discharges of gastrointestinal efferents, which increased. Arterial blood pressure, cardiac output and total peripheral resistance fell markedly. A shock syndrome occurred which could be controlled by atropine injection if timely. From the results it was concluded that the higher dose of paraoxon blocked synaptic transmission in the paravertebral ganglia of the sympathetic trunk, and facilitated impulse transmission in the prevertebral abdominal ganglia. (Author abstract by permission)

79-0625. Johnson, M. K. (MRC Toxicol. Unit, Carshalton, Surrey, SM5 4EF, England) **The anomalous behaviour of dimethyl phosphates in the biochemical test for delayed neurotoxicity.** *Arch. Toxicol.* 41(1): 107-110; 1978. (6 references)

Several dimethyl phosphates (including dichlorvos) behave anomalously in tests for delayed neurotoxicity. Doses given to hens caused high inhibition of brain neurotoxic esterase (NTE) but no ataxia. Less inhibition of NTE was seen in spinal cord than in brain. Di-isopropyl phosphorofluoridate (DFP) caused equal inhibition of NTE in brain and cord. When dosing with dimethyl phosphates was repeated NTE inhibition in cord increased and pair-dosed birds became ataxic. *In vitro*, brain and cord NTE were indistinguishable but the *in vivo* discrepancy between inhibition of brain and cord NTE was matched by a similar discrepancy in inhibition of AChE. It appears that ataxia arises from inhibition of spinal cord NTE and that only in the present cases (among about 200) was the effect in brain not a perfect biochemical monitor. (Author abstract by permission)

79-0626. Carevic, O. (Pliva Res. Inst., Zagreb, Yugoslavia) **[Ucinakkloriranog insekticida na propustnost lizosomskih membrana u jetri stakora.] [Effects of organochlorine pesticides on the permeability of the lysosomal membrane of rat liver.]** *Arh. Hig. Rada Toksikol.* 28(4): 404; 1977. (Croatian)

Rat livers were examined at various time intervals after uniform treatment with organochlorine pesticides to determine the degree of permeability of the lysosomal membranes. Damage to the liver, due to weakening of the lysosomal membrane by γ-HCH (lindane), was observed. [Abstract No. 20.]

79-0627. Corbett, M. D.; Chipko, B. R.; Baden, D. G. (Rosenstiel Sch. Mar. & Atmos. Sci., Univ. Miami, Miami, FL 33149) **Chloroperoxidase-catalysed oxidation of 4-chloroaniline to 4-chloronitroso benzene.** *Biochem. J.* 175(2): 353-360; 1978. (38 references)

The incubation of 4-chloroaniline with chloroperoxidase and H_2O_2 resulted in a rapid formation of 4-chloronitrosobenzene. This enzymic oxidation displayed a pH optimum at 4.4 with a km of 0.00081 M and catalytic-centre activity of 312. The initial rate of the reaction was strongly affected by the presence of halide ions. 4-Chlorophenylhydroxylamine was even more rapidly converted into the ni-

troso compound. A reaction mechanism is proposed on the basis of currently accepted theory for the catalytic action of chloroperoxidase. A noteworthy aspect of this new reaction is the difference in the products previously reported for the action of classical peroxidases on anilines and the single nitroso product resulting from chloroperoxidase oxidation. (Author abstract by permission)

79-0628. Abou-Donia, M. B. (Dep. Pharmacol., Duke Univ. Med. Cent. Durham, NC 27710) **Role of acid phosphatases in delayed neutrotoxicity induced by leptophos in hens.** *Biochem. Pharmacol.* 27(16): 2055-2058; 1978. (25 references)

Acid phosphatase levels in the plasma of hens were examined after they had received prolonged oral exposure to leptophos. The oral administration began with a single dose of 0.5, 1, 2.5, 5, 10, and 20 mg/kg of technical leptophos and continued until the onset of paralysis, but no longer than 129 days. Hens receiving 0.5 mg/kg were given the dose only 73 days. Progress of clinical signs of toxicity was graded into four stages of ataxia prior to paralysis. The first stage was characterized by diminished leg movement, a reluctance to walk, and a tendency to slide along the floor or fly. In stage two there was a disturbances of the control of leg movement with a change in gait. In stage three severe ataxia was characterized by the legs sprawled out in front without ability to stretch or lower the legs. In the fourth stage there was difficulty in moving the legs, inability to stand or walk, and a tendency to sit down on the hocks most of the time. Respiratory and swallowing difficulties were noted at stage four with some birds showing a rapid irregular tremor. The daily oral administration of single doses of leptophos inhibited plasma ChE activity. This inhibition was greatest in hens given 20 mg/kg/day. It is suggested that the increased acid phosphatase activity which was noted, accompanied by the decreased plasma ChE activity, may act as an early warning index of overexposure to leptophos.

79-0629. Viviani, A.; Lutz, W. K.; Schlatter, C. (Inst. Toxicol., Fed. Inst. Technol., Univ. Zurich, CH-8603 Schwerzenbach, Switzerland) **Time course of the induction of aryl hydrocarbon hydroxylase in rat liver nuclei and microsomes by phenobarbital, 3-methylcholanthrene, 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, dieldrin and other inducers.** *Biochem. Pharmacol.* 27(17): 2103-2108; 1978. (29 references)

Aryl hydrocarbon hydroxylase (AHH) has been measured in male rat liver nuclei and microsomes after treatment of adult animals with various inducers for up to 14 days. After daily ip injections of 3-methylcholanthrene (MC, 20 mg/kg) the nuclear activity increased to a maximum of 600% of the control activity after 4 days whereas the microsomal activity was 400% of control at the same date. After 12 days, both activities equilibrated at 400%. A similar time course was found after a single ip injection of 2,3,7,8-tetrachloro-dibenzo- *p*-dioxin (TCDD, 0.01 mg/kg) with an induction to 500 and 300% for nuclei and microsomes, respectively, after 2 days, and to 400% for both after 12 days. Phenobarbital (PB) was given continuously in the drinking water (1 g/l) and induced the microsomal activity to 200% after 8 days and 170% after 14 days. The nuclear activity was only slightly induced to a constant level of 130 per cent between day 8 and 14. Dieldrin did not significantly increase the microsomal activity after daily ip injections (20 mg/kg), but the nuclear activity raised to 200% after 3 days and levelled down to control values after 12 days. Other inducers tested were benz[*a*]anthracene (BA), hexachlorobenzene (HCB) and 1,1,1-trichloro- 2,2-bis(*p*- chlorophenyl)ethane (DDT). The induction pattern with BA was similar to that of MC, a model compound for the group of cytochrome P448 inducers. The induction by HCB and DDT resembled that by PB, a typical cytochrome P450 inducer. (Author abstract by permission)

79-0630. Bulger, W. H.; Muccitelli, R. M.; Kupfer, D. (Worchester Found, Exp. Biol., Shrewsburg, MA 01545) **Studies on the *in vivo* and *in vitro* estrogenic activities of methoxychlor and its metabolites. Role of hepatic mono-oxygenase in methoxychlor activation.** *Biochem. Pharmacol.* 27(20): 2417-2423; 1978. (34 references)

The injection of rats with methoxychlor stimulated uterine ornithine decarboxylase (ODC) activity and caused an increase in uterine weight 7 hr after injection. The di-demethylated derivative of methoxychlor [2,2-bis(*p*-hydroxyphenyl- 1,1,1-trichloroethane] (HPTE) markedly stimulated rat uterine ODC and enlarged uterine wet weight 6 hr after administration. Because we previously demonstrated that HPTE, but not methoxychlor, inhibited the binding of [^{3}H]estradiol-17β ([^{3}H]E_2) to uterine cytosolic estrogen receptor *in vitro*, we considered the possibility that the estrogenic activity of methoxychlor *in vivo* was due to biotransformation of methoxychlor. The evolution of formaldehyde occurred when methoxychlor was incubated with rat hepatic microsomes in the presence of NADPH, indicating that methoxychlor was *O*- demethylated *in vitro*. The demethylation of methoxychlor was inhibited when methoxychlor was incubated with microsomes in the presence of hexobarbital or 2-diethylaminoethyl diphenyl-propylacetate hydrochloride (SKF-525A), suggesting the involvement of mono-oxygenase. Furthermore, the demethylated products were resolved by thin-layer chromatography (tlc) into three chromatographically distinct components more polar than methoxychlor. One of the products appears to be the di-demethylated derivative of methoxychlor, since it was chromatographically identical to HPTE in three tlc systems. Each of the three components inhibited [^{3}H]E_2 binding to rat uterine cytosol *in vitro*; however, the metabolite with an R_f equal to that of HPTE demonstrated equal potency to HPTE with respect to suppression of [^{3}H]E_2 binding to uterine cytosol. The possible involvement of mono-oxygenase in biotransformation in methoxychlor into estrogenic metabolites *in vivo* is discussed. (Author abstract by permission)

79-0631. Lindahl, R.; Roper, M.; Deitrich, R. A. (Dev. Biol. Sect., Dep. Biol., Univ. Alabama, University, AL

35486) **Rat liver aldehyde dehydrogenase-Immunochemical identity of 2,3,7,8-tetrachlorodibenzo- *p*-dioxin niducible normal iver and 2-acetylaminofluorene inducible hepatoma isozymes.** *Biochem. Pharmacol.* 27(20): 2463-2465; 1978. (21 references)

The aldehyde dehydrogenase (ALDH) which is inducible by 2,3,7,8- tetrachlorodibenzo-*p*-dioxin (TCDD) has been purifed from rat liver microsomes. This isoenzyme, designated τ, is distinguishable immunochemically, physically, and functionaly from the ϕ isozyme. These two in turn are also distinguishable from a series of α-isozymes which are inducible by chemical carcinogens, 2-acetylaminofluorene and dimethyl aminoazobenzene. Experiments were conducted to determine the functional, structural and genetic relationships among these three isozymes. Rabbit antiserum against rat hepatoma-specific ALDH was prepared and Ouchterlony 2-diminsional immunodiffusions were performed to investigate the the immune complexes formed by the three different isozymes. Results indicate that the rabbit antiserum directed against the τ isozyme reacts with complete identity when tested with a series of tumor-specific aldehyde dehydrogenases obtained from rats treated with 2-acetylaminofluorene. DDT, mirex, β-naphthoflavone, and PCB were successful in inducing both the ϕ and τ isozymes as shown in kinetic and immunological studies. Also, populations of antibodies against the hepatoma-specific ALDH reacted with complete identity in test systems with normal liver TCDD-inducible ALDH.

79-0632. Langel, U. ; Jarv, J. (Tartu State Univ., Tartu, USSR) **Influence of pH on butyrylcholinesterase reaction with organophosphorus inhibitors.** *Biochim. Biphys. Acta* 526(2): 450-456; 1978. (19 references)

The non-covalent enzyme inhibitor complex dissociation constants and the enzyme phosphorylation rate constants were measured as functions of pH in butyrylcholinesterase (acylcholine acylhydrolase, EC 3.1.1.8) reaction with organophosphorus inhibitors $(C_2H_5O)_2(O)SX$, where X = $(CH_2)_2SC_2H_5$ and $(CH_2)_6S+(CH_3)C_2H_5$. Two ionizing groups, a basic and an acidic one, were revealed in the overall reaction of the enzyme inhibition within the pH range between 5 and 10.5. In the enzyme phosphorylation step only the acidic group was found, while the basic group appeared in the non-covalent binding step of both the ionic and non-ionic compounds. The results strongly imply the participation of the basic functional group in the conformation; transition which affects the ability of butylrylcholinesterase to bind hydrophobic reagents in the acidic pH region. (Author abstract by permission)

79-0633. Marshall, L. E.; Himes, R. H. (Dep. Biochem., Univ. Kansas, Lawrence, KS 66045) **Rotenone inhibition of tubulin self-assembly.** *Biochim. Biophys. Acta* 543(4): 590-594; 1978. (16 references)

Rotenone effectively inhibits the *in vitro* formation of microtubles from tubulin containing or lacking microtubule-associated proteins. In both cases a concentration of rotenone equal to that of tubulin present completely blocks assembly. The inhibition can be reversed by the addition of dimethylsulfoxide or by removing rotenone with charcoal. (Author abstract by permission)

79-0634. Nelson, S. R.; Doull, J.; Tockman, B. A.; Cristiano, P. J.; Samson, F. E. (Dep. Pharmacol., Univ. Kansas Med. Cent., Coll. Health Sci., Kansas City, KS 66103) **Regional brain metabolism changes induced by acetylcholinesterase inhibitors.** *Brain Res.* 157(1): 186-190; 1978. (8 references)

The functional mapping technique was used in a study on 15 rats, 7 of which were treated with organic phosphate insecticides, trichlorfon and oxydemeton-methyl and 2 others with the carbamate cholinesterase inhibitors, physostigmine salicylate (0.46 mg/kg) and neostigmine methyl sulfate (0.3 mg/kg). The mapping technique indicated anatomical areas of altered metabolic rate. An increase and a decrease in functional activity occurred in brains of insecticide-treated rats. Increased activity was noted in the visual pathway, indicating that acetylcholine is stimulatory in at least part of this system. The decrease in activity was noted generally in most areas of grey matter and may be due to inhibitory effects of acetylcholine of a secondary nature. However, it is also possible that, since physostigmine did not produce an appreciable depression of grey matter activity, the organic phosphate insecticides may have separate, direct effects on the central nervous system. It is suggested that these central nervous system effects may be clinically significant during long-term, repeated exposures to these insecticides.

79-0635. Tos-Luty, S.; Przylepa, E.; Matysek, W.; Latuszynska, J.; Cisak, E. (Inst. Fundam. Res., Inst. Med. Res. & Hyg., PL-20950 Lublin, Poland) **Badanie wlasciwosci uczulajacych chlorfenwinfosu za pomoca testu transformacji blastycznej limfocytow. [Studies of sensitizing properties of chlorfenvinphos using the lymphocyte blast transformation test.]** *Bromatol. Chem. Toksykol.* 10(3): 251-256; 1977. (5 references) (Polish)

The sensitizing effect of chlorfenvinphos was studied in lymphocytes from rats treated with chlorfenvinphos intragastrically or intradermally for 1-5 mo by the blast transformation test in Parker's solution in the presence of chlorfenvinphos (0.033 and 0.33 $\mu g/cm^3$), or phytohemagglutinin (PHA), or in the absence of stimulants. Intragastric or intradermal treatment with chlorfenvinphos for 5 mo caused significant sensitization. The percentages of transformed lymphocytes were 31.7% in the absence of stimulant, versus 14.6% in the controls; 32.2% in the presence of PHA (19.8% in the controls); 36.2% in the presence of 0.33 $\mu g/cm^3$ of chlorfenvinphos (17.6% in the controls); and 28.3% in the presence of 0.033 $\mu g/cm^3$ of chlorfenvinphos (13.2% in the controls). The blood sugar level was significantly lower in the experimental animals than in the controls 2-5 mo after the beginning of the experiment (78.43-91.63 mg/l versus 96.9-156 mg/l).

79-0636. Kapur, K.; Kamaldeep, K.; Toor, H. Ś. (Dep. Zool., Punjab Agric. Univ., Ludhiana, India.) **The effect of fenitrothion on reproduction of a teleost fish, *Cyprinus carpio communis* Linn: A biochemical study.** *Bull. Environ. Contam. Toxicol.* 20(4): 438-442; 1978. (22 references)

Specimens of *Cyprinus carpio communis* Linn. were acclimatized for 1 wk and then exposed to either a safe concentration of 0.30 ppm or a sublethal concentration of 1.5 ppm fenitrothion. Exposure to fenitrothion caused a great reduction in the activity of the 3-β HSD in the testicular and ovarian extracts. The activity of 3-β HSD was reduced to about 80% and 71.1% for males and about 91.2% and 83.8% in females, when treated with lower and higher doses, respectively. These findings indicate an inhibition of steroidogenesis in gonadal tissue due to exposure to an organophosphorus pesticide.

79-0637. Sastry, K. V.; Sharma, S. K. (Dep. Zool., D.A.V. Coll., Muzaffarnagar, India.) **The effect of *in vivo* exposure of endrin on the activities of acid, alkaline and glucose-6-phosphatases in liver and kidney of *Ophiocephalus (Channa) punctatus*.** *Bull. Environ. Contam. Toxicol.* 20(4): 456-460; 1978. (19 references)

Exposure of *Ophiccephalus punctatus* for 20 days to endrin at a concentration of 0.01 mg/l caused a decrease in the activities of alkaline phosphatase and glucose-6-phosphatases in liver homogenates *in vitro* with the most significant decrease occurring in the glucose-6-phosphatase activity. Stimulation was noted in the activity of the liver acid phosphatase. In the kidney stimulation was noted in the activities of all three of these enzymes. The alterations in the activities of these three enzymes are thought to be linked to the autolytic and disintegration processes of cells in response to endrin toxicity.

79-0638. Byczkowski, J. Z.; Tluczkiewicz, J. (Dep. Pharmacol., Med. Sch. Gdansk, PL-80227 Gdansk-6, Poland) **Comparative study of respiratory chain inhibition by DDT and DDE in mammalian and plant mitochondria.** *Bull. Environ. Contam. Toxicol.* 20(4): 505-512; 1978. (15 references)

In experiments designed to compare the effects of DDT and DDE on rat liver and brain mitochondria with those on wheat and rye seedling mitochondria, the rat liver mitochondria appeared more sensitive than the other sources of mitochondria. It is noted that rye seedlings, wheat seedlings and rat brain mitochondria were equally sensitive to both DDT and DDE. Both DDT and DDE affected the electron transfer chain of the germinating cereal seedlings mitochondria in a manner similar to that in rat liver mitochondria. Oxidative phosphorylation in rye and wheat seedling mitochondria was less sensitive to uncoupling action of these pesticides when compared to rat brain and liver mitochondria.

79-0639. Steinwandter, H. (Hess. Landwirtsch. Versuchsanst., D-6100 Darmstadt, BRD) **Experiments on lindane metabolism in plants. III. Formation of β-HCH.** *Bull. Environ. Contam. Toxicol.* 20(4): 535-536; 1978. (4 references)

Four samples of grass were contaminated with α-HCH (α-BHC) and stored together with blank samples in a closed room. Periodic analysis of the contaminated samples was carried out. Originally the samples were contaminated with a concentration of 2 ppm α-HCH. Analysis of samples which had not been contaminated with α-HCH showed that there was an average concentration of 0.019 ppm β-HCH (β-BHC) present. Analysis of the samples contaminated with α-HCH showed an average β-HCH content of 0.073 ppm. The difference results from the conversion of the added α-HCH to β-HCH. This allows the conclusion that lindane may act as an additional source of contamination for the insecticide β-HCH.

79-0640. Beck, S. L. (Biol. Dep., Wheaton Coll., Norton, MA 02766) **Concentration and toxicity of trifluralin in CD-1 mice, presented intragastrically or intraperitoneally.** *Bull. Environ. Contam. Toxicol.* 20(4): 554-560; 1978. (12 references)

Trifluralin, at dose levels ranging between 0.375 and 10.0 g/kg, was given either by ig intubation or ip injection, dissolved in corn oil, to random-bread female CD-1 mice. The study revealed increased toxicity with increased dilution in the ig administration, which could be attributed to enhanced absorption of the compound in large vehicle volumes while it is transiently present in the gut. This finding suggests that not only dose, but also concentration should be reported for a meaningful assessment of toxicity of various compounds under testing. In those mice receiving the chemical by the ig route, no major differences in weight changes were seen during the course of treatment, between different treatment groups or between replicates within each group. In the mice receiving the chemical via the ip route, there was a weight loss among survivors at 24 hr after treatment. At the termination of the study, 14 days after treatment, some recovery was noted in body weight, but other mice continued to lose weight.

79-0641. Bojan, F.; Nagy, A.; Herman, K. (Inst. Hyg. & Epidemiol., Inst. Pathol., Univ. Med. Sch., 4012 Debrecen, Hungary.) **Effect of butylated hydroxytoluene and paraquat on urethan tumorigenesis in mouse lung.** *Bull. Environ. Contam. Toxicol.* 20(4): 573-576; 1978. (13 references)

Female CFLP mice were exposed to butylated hydroxytoluene (BHT) dissolved in corn oil and paraquat dissolved in saline. The maximum tolerable single dose of BHT administered ip was found to be 800 mg/kg. Paraquat treatment resulted mainly in toxic damage to the alveolar epithelium. During regeneration, mitotic activity of II type alveolar cells was enhanced. Both BHT and paraquat enhanced the carcinogenicity of urethan in CFLP mice. Paraquat significantly enhanced the number of lung tumors induced by urethan 2 days after the paraquat exposure occurred. This was a dose dependent effect. It is suggested that both BHT and paraquat enhance the carcinogenicity of urethan by increasing the number of proliferating target cells in the lung.

79-0642. Down, W. H.; Chasseaud, L. F. (Dep. Metab. & Pharmacokinet., Huntingdon Res. Cent., Huntingdon PE18 6ES, England) **The effect of DDT on hepatic microsomal drug-metabolising enzymes in the baboon: comparison with the rat.** *Bull. Environ. Contam. Toxicol.* 20(5): 592-601; 1978. (29 references)

p,p'-DDT was administered to both baboons and rats at different dose levels for up to 21 days. The baboons received DDT by oral intubation at levels of 5, 15, or 50 mg/kg/day. Male CD rats received DDT at levels of 5, 15, or 50 mg/kg/day. In neither species was there any noticeable effect on food consumption, body weight gain, general health or behavior. Hepatic cytochrome P450 concentrations in rats were increased by similar amounts at all dose levels tested whereas concentrations in baboon were dose-related. Glucuronyl transferase activity in both species were not changed after DDT administration at dose levels of 5 and 15 mg/kg/day, and was partly inhibited at 50 mg/kg/day. The increase in activities of *O*-demethylase and *N*-demethylase in baboons was generally dose-related, whereas in rats, *O*-demethylase activity was increased relative to controls, but not dose-related. Hydroxylase and reduction activities were both increased in both animals, but the increase was not a dose-related function.

79-0643. Kanazawa, J. (Natl. Inst. Agric. Sci., Kita-Ku, Tokyo 114, Japan) **Bioconcentration ratio of diazinon by freshwater fish and snail.** *Bull. Environ. Contam. Toxicol.* 20(5): 613-617; 1978. (4 references)

Studies on body weights of four species of fish, two species of snails and one species of crayfish and test water concentrations of diazinon were related to bioconcentration ratios. Three or four of each species were placed in a continuous flow aquarium and exposed to about 10 ppm diazinon. The individual partition coefficients were measured by GLC and then averaged for each species. The average bioconcentration ratios were: in fish, from 152 for topmouth gudgeon to 17.5 for guppies; in snails, 17.0 for red snail to 5.9 for pond snails; and in the crayfish, 4.9. Absorption and excretion studies on the topmouth gudgeon were also performed. A linear relationship between body weights and bioconcentration ratios were noted.

79-0644. Rosenstein, L.; Chernoff, N. (Exp. Biol. Div., Health Effects Res. Lab., US EPA, Research Triangle Park, NC 27711) **Spontaneous and evoked EEG changes in perinatal rats following in utero exposure to Baygon: a preliminary investigation.** *Bull. Environ. Contam. Toxicol.* 20(5): 624-632; 1978. (6 references)

Baygon (propoxur) at levels of 1000 ppm was administered to pregnant albino rats in the diet from day 6 of gestation through day 15 postpartum. Animals on the contaminated diet gained significantly less weight than did controls (93 g as compared with 102 g). Litters of Baygon-exposed dams consistently weighed less than did controls. Pups born to Baygon-treated dams showed a significant delay in the development of the startle reflex. Time interval analysis of electroencephalograms (EEG) indicated selected differences existed. From the data gathered it is concluded that Baygon, administered to female rats at high dose levels during gestation and lactation, produced alterations in the EEG of the offspring. The cause of the effect is not defined.

79-0645. Geike, F. (Inst. Nichtparasit Pilanzenkrankheit., Biol. Bundesanst. Land. & Forstwirtschaft, D-1000 Berlin 33, BRD) **Effect of hexachlorobenzene (HCB) on the activity of some enzymes from *Tetrahymena pyriformis*.** *Bull. Environ. Contam. Toxicol.* 20(5): 640-646; 1978. (36 references)

The effect of HCB (hexachlorobenzene) on the activity of 8 enzymes was evaluated. *Tetrahymena pyriformis* was grown in continuous culture media to which 0, 0.001, 0.1, or 1.0 ppm HCB, in 0.4% acetone, was added. At 0.001 ppm the activities of δ-aminolevulinate dehydratase, hexokinase, and pyruvate kinase was unaffected and GOT, glutamic dehydrogenase, isocitrate dehydrogenase (ICDH), and malate dehydrogenase (MDH) activities increased. At 0.1 ppm, HCB increased the activities of each enzyme studied, except GPT, which was depressed. At 1.0 ppm HCB, the activities of most of the enzymes were lower than control values, with the exception of the two mitochondrial enzymes, MDH and ICDH.

79-0646. Geike, F.; Parasher, C. D. (Inst. Nichtparasit. Pflanzenkrankheit., Biol. Bundesanst. Land & Forstwirtschaft, D-1000 Berlin 33, BRD) **Effect of hexachlorobenzene (HCB) on photosynthetic oxygen evolution and respiration of *Chlorella pyrenoidosa*.** *Bull. Environ. Contam. Toxicol.* 20(5): 647-651; 1978. (6 references)

Cells of *Chlorella pyrenoidosa* strain 211-8*b* were exposed to 0, 0.1, 1.0, and 5.0 ppm HCB (hexachlorobenzene) in acetone solution. Only a slightly negative effect on respiration of the cells was seen and only at the higher concentrations. However, effects on the photosynthetic oxygen evolution were noted at all levels of exposure; at 5.0 ppm HCB caused maximum inhibition of about 51%. The percent inhibition recorded at 0.1 ppm was 33.3%, and at 1.0 ppm, 42%.

79-0647. Agarwal, H. C.; Yadav, D. V.; Pillai, M. K. K. (Dep. Zool., Univ. Delhi, Delhi 110007, India) **Metabolism of ^{14}C-DDT in *Pheretima posthuma* and effect of pretreatment with DDT, lindane and dieldrin.** *Bull. Environ. Contam. Toxicol.* 20(5): 668-671; 1978. (8 references)

Earthworms (*Pheretima posthuma*) were maintained in soil plots (5 kg) treated with standard solution of 1 mg/ml (w/v) of *p,p'*-DDT, lindane or dieldrin. After 7 days, the worms were removed from the soil and injected intraprostomially with 0.1 μCi of ^{14}C-labeled DDT. In worms treated only with ^{14}C-DDT, DDT was metabolized to *p,p*ç-DDE and *p,p'*-DDD (TDE) after 12 hr; the proportions were 18.9 and 17.6% of total metabolites found, respectively. After 24 hr, the same metabolites were present, but a slight decrease in the quantities of DDT and its metabolites was noted, perhaps due to excretion. When the worms had been pretreated with

DDT, the total percentage of metabolites was the same, but DDE became the predominant metabolite. Pre-treatment resulted in an accelerated metabolism of DDT. Pretreatment with lindane also caused accelerated metabolism. Similarly an accelerated metabolism of ^{14}C-DDT was noted in worms pre-treated with dieldrin.

79-0648. Sastry, K. V.; Sharma, S. K. (Dep. Zool., D. A. V. College, Muzaffaragar, U.P., India) **The effect of endrin on the histopathological changes in the liver of *Channa punctatus*.** *Bull. Environ. Contam. Toxicol.* 20(5): 674-677; 1978. (19 references)

Twenty fish (*Channa punctatus*) were injected intraperitoneally with a sublethal dose of 2.5 mg endrin/kg body weight. A second group were injected with distilled water to serve as controls. Treatment with endrin caused acute pathological changes in the liver; hypertrophy of hepatocytes was apparent 8 hr following injection. Toxic changes were more severe in the centrolobular area than in the perilobular area. At 12 hr post-injection, the degenerative changes were further increased with hepatic cells appearing more swollen and hypertrophy of the nucleus more pronounced. After 24 hr, acute pathological conditions were produced in the liver. Marked hypertrophy of hepatic cells was observed and necrosis was even more severe. These changes are not characteristic of endrin alone, but are found after exposure to various organochlorine compounds.

79-0649. Newsome, W. H.; Yagminas, A. P.; Villeneuve, D. C.; Franklin, C. A. (Food Direct., Health Prot. Branch, Health & Welfare Canada, Ottawa, Ont., Canada) **The effect of sodium bromide ingestion on the goitrogenic action of ethylenethiourea in the male rat.** *Bull. Environ. Contam. Toxicol.* 20(5): 678-686; 1978. (23 references)

Male Sprague-Dawley rats were divided into groups of 10 and fed diets containing 0, 200 or 2000 ppm sodium bromide; 0, 25, 50, or 100 ppm ETU (ethylene thiourea); and 200 and 2000 ppm sodium bromide in combination with 25, 50, or 100 ppm ETU. These contaminants were given in the regular diet. Over the dose range studied, the goitrogenic effect of ETU was only slightly augmented by the inclusion of sodium bromide in the diet. Rats fed ETU, up to concentrations of 100 ppm, showed a significant reductions decrease in body weight gain. A slight, but non-significant, decrease in food consumption was noted in groups fed 50 and 100 ppm ETU. ETU at all levels caused increased liver/body weight ratios.

79-0650. Kar, S.; Singh, P. K. (Lab. Blue-green Algae, Cent. Rice Res. Inst., Cuttack 753006, Orissa, India) **Toxicity of carbofuran to blue-green alga *Nostoc muscorum*.** *Bull. Environ. Contam. Toxicol.* 20(5): 707-714; 1978. (13 references)

The nitrogen fixing blue-green alga *Nostoc muscorum* was exposed to commercial grade Furadan, containing carbofuran. Survival of the alga was studied at concentrations ranging from 10 to 1000 μg/ml and toxicity tests were performed at concentrations of 1000 to 1500 μg/ml. Detoxification testing was done using three high concentrations of pesticide of 250, 500, and 1000 μg/ml. The growth response of the alga was determined in both C + N and C-N media. The alga tolerated a concentration of 1000 μg/ml; higher concentrations did not support growth in either media. Growth was not affected by concentrations of 10 μg/ml; at concentrations of 25 μg/ml a progressive decline in growth was noted. It was observed that lower concentrations of Furadan enhanced survival, growth and nitrogen fixation in the alga but these were gradually inhibited at higher concentrations of 50 to 1000 μg/ml. Biodegradation of the pesticide was noted.

79-0651. Tonkopii, V. D.; Ardab'eva, T. V. (S. M. Kirov Mil. Med. Acad., Leningrad, USSR) **Vliyanie obratimykh ingibitorov na reaktsionnuyu sposobnost' funktsional'nykh uchastkov aktivnogo tsentra atsetilkholinesterazy. [Effect of reversible inhibitors on the functional sites of acetylcholinesterase active center reactivity.]** *Byull. Eksp. Biol. Med.* 86(10): 441-444; 1978. (13 references) (Russian)

The effects of galanthamine, tacrine, and oxazyl on the phosphorylation of human erythrocyte acetylcholinesterase (AChE) by armine and Gd-42 (*o*-ethyl-*s*-β-ethylthioethyl ester of methyl thiophosphinic acid) were studied *in vitro*. In the presence of galanthamine, the organophosphorus inhibitors interacted only with the active center of the enzyme whose anionic site was not occupied by the reversible inhibitor. Tacrine and oxazyl decreased the rate of phosphorylation. Oxazyl interacted with the peripheral allosteric anion zones, and tacrine was absorbed in the allosteric hydrophobic zone or in the hydrophobic zones of the active surface of AChE. The combination of tactine and oxazyl with the non-catalytic zones of AChE not only led to a complete loss of the reactivity of that zone of the active center, which was not involved in the hydrolysis of acetylcholine, but it also reduced the reactivity of the free enzyme.

79-0652. Chadwick, R. W.; Bryden, C. C.; Copeland, M. F.; Freal, J. J.; Sovocool, G. W. (Environ. Toxicol. Div., Health Effects Res. Lab., US EPA, Research Triangle Park, NC 27711) **The identification of three previously unreported lindane metabolites from mammals.** *Chemosphere* 7(8): 633-640; 1978. (17 references)

Weanling female Sprague-Dawley rats were fed diets containing 400 ppm lindane (8-hexachloro cyclohexane) for 1 mo. Daily urine samples were analyzed for lindane metabolites. Two unknown neutral metabolites, M-1 and M-2, which had shorter GLC retention times than a previously identified PCCOL metabolite, were detected in the urine. These metabolites were found to be excreted primarily as glucuronide and sulfate conjugates. The mass spectra of M-1 and M-2 have molecular ions at 234 a.m.u. that showed a 4 Cl isotope cluster. However, the intensity of this ion was 30 times greater for M-2. Further mass spectra, and dehydrogenation studies tentatively identified M-2 as a configurational isomer of 2,4,5,6-tetrachloro- 2-cyclohex-1-ol (2,4,5,6-TCCOL). M-1

was tentatively identified as 2,3,4,6 TCCOL. Lindane, together with the NADPH generating system, can also form the non-polar metabolite 3,4,5,6- tetrachlorocyclohex-1-ene TCCH. The presence of these metabolites demonstrates that this pesticide can be degraded by several pathways in the environment.

79-0653. Renner, G.; Schuster, K. P. (Pharmakol. Inst., Univ. Muenchen, Munich, BRD) ***N*-acetyl- *S*-(pentachlorophenyl) cysteine, a new urinary metabolite of hexachlorobenzene.** *Chemosphere* 7(8): 663-668; 1978. (8 references)

The isolation and identification of a new metabolite, *N*-acetyl-*S*- (pentachlorophenyl) cysteine (PCC), has been made from rat urine. Urine of rats, which had been fed 200 mg HCB/wk, was adjusted to pH 1 and extracted with chloroform. After distillation, the sample of colorless crystalline product was chromatographed on HP TLC in benzene: acetic acid solvent. A spot of R*f* 0.38 corresponded to PCC. Further identification of the residue was carried out by dissolving in ethanol and chromatographing on benzene-acetone solvent. For separation of PCC from other substances or further purification, the start line was eluted with methanol and rechromatographed on TLC and on HP-TLC with benzene: acetone solvent. The spectra were identical to that synthesized by PCC.

79-0654. Renner, G.; Schuster, K. P. (Pharmakol. Inst., Muenchen, Munich, BRD) **Synthesis of hexachlorobenzene metabolites.** *Chemosphere* 7(8): 669-674; 1978. (14 references)

A metabolite of hexachlorobenzene has been identified as PCC: *N*-acetyl-*S*- (pentachlorophenyl) cysteine. Studies were made to distinguish PCC from other chlorothiophenols. GC, mass spectra studies, as well as HPLC and TLC analyses were done. IR spectrometry indicated a relative intensity for PCC about the same as for TCC. The IR spectra of these compounds are between 3500-625/cm.

79-0655. Carricaburu, P.; Lacroix, R.; Lacroix, J. (Dep. Physiol. Fac. Med., 75270 Paris 05, France) **Action du carbaryl sur l'electroretinogramme de la Souris blanche. [Action of carbaryl on the electroretinogram of the albino mouse.]** *C. R. Acad. Sci. [D]* 287: 277-279; 1978. (5 references) (French)

The effect of carbaryl (2.5 mg ip) on the electroretinogram of NMRI Swiss mice was studied, using electronic flash for stimulation. Carbaryl was found to cause profound alterations of the electroretinogram; manifested as an increase in the latency and a decrease of the amplitude, followed by a suppression of *b*-wave. This action is assumed to be provoked by the anticholinergic properties of carbamates, which result in a section of the retinal synapse.

79-0656. Zavala, D. C.; Rhodes, M. L. (Dep. Med., Univ. Iowa, Iowa City, Iowa) **An effect of paraquat on the lungs of rabbits. Its implications in smoking contaminated marihuana.** *Chest* 74(4): 418-420; 1978. (10 references)

Five different routes of administration were used to expose rabbits to paraquat. Four rabbits each received the chemical via the intraperitoneal, subcutaneous, intravenous, or oral route, and 36 received paraquat by the intrabronchial route. Dosing was given by single injection or, in the case of oral exposure, the chemical was administered mainly by stomach tube. The dose ranged from 0.1 g to 1 pg, for rabbits exposed via bronchial catheter. For all other routes of administration, a dose of 25 mg/kg was used. For each dosage one rabbit was killed by injection of pentobarbital at 48 to 72 hr, one at 96 hr, and one at two wk. The 12 animals that received 25 mg paraquat dichloride/kg orally, intraperitoneally, or subcutaneously exhibited negligible to mild evidence of pulmonary hemorrhage or edema on gross or light-microscopic examinations. No residual pulmonary damage was noted two wk later. Animals receiving 25 mg/kg iv exhibited a more severe but moderate pathologic change. At the end of two wk these animals showed only minimal generalized hemorrhagic lesions and mild thickening of the alveolar walls. Intrabronchial administration even of minute quantities caused focal pulmonary edema, hemorrhage, and fibrosis in rabbits. Concentrations of 0.1 g to 10 μg caused satellite lesions around the central areas of pulmonary damage. This can be explained by the direct spread of the chemical. In view of the pulmonary damage seen at the 1 pg level of intrabronchially administered paraquat dichloride, there should be concern for individuals who smoke heavily contaminated marihuana cigarettes.

79-0657. Greenberg, D. B.; Reiser, K. M.; Last, J. A. (Dep. Int. Med., Univ. California, Davis, CA) **Correlation of biochemical and morphologic manifestations of acute pulmonary fibrosis in rats administered paraquat.** *Chest* 74(4): 421-425; 1978. (24 references)

Male rats of the Sprague-Dawley strain were injected ip with a 2.9% paraquat solution at a dose of 24 mg/kg. Evaluations of the damage done to the animals were made at 1, 2, 3, 6, and 7 days following exposure. Paraquat increased the proline pool size of lung slices to 179% of control values by day 3, and by the 7th day the increase was 329% of controls. The overall rates of protein synthesis by lungs from control and from paraquat-treated rats were similar at days 1 and 2. However, the tissue from exposed rats subsequently increased the rate of protein synthesis a 4-fold higher than normal tissue from controls. By the second day the rate of hydroxyproline synthesis in the lung slices was significantly elevated and continued to increase through day 7. On the first day the most striking pathologic event was mild, relatively acellular, perivascular edema, throughout all three lobes examined and affecting all sizes of vessels. By the 6th day after injection marked widespread pathologic changes were noted with much of the alveolar architecture obliterated by cellular infiltration. Thus it was concluded that in the animal model used in these studies, the injection of high doses of paraquat caused acute pulmonary fibrosis. The second main conclusion was that there was a correlation between the vari-

ous indicators of gross damage evaluated, such as the biochemical findings in the tissue mince experiments, and the histopathologic findings, as a function of time after the exposure to the chemical.

79-0658. Vea, E. V.; Cutkomp, L. K.; Halberg, F. (Dep. Entomol., Fish. & Wildl., Univ. Minnesota, Minneapolis, MN) **Interrelationships of oxygen consumption and insecticide sensitivity.** *Chronobiologia* 4(4): 313-323; 1977. (36 references)

Dichlorvos solution was distributed uniformly over an onionskin paper lining a glass Petri dish. The solvent was allowed to evaporate completely for 6 min. Insects were exposed at each insecticide concentration, being introduced into the center of the treated surface. After 6 min of exposure the beetles were removed from the treated surface and transferred to a plastic dish containing food. At this time they had continuous lighting. At the end of the 24 hr test period mortality was determined and treated insects were transferred to a room with 12 hr of light and 12 hr of darkness. Final mortality counts were made one wk after treatment. Results indicate maximal sensitivity of the flour beetles to the toxicant at about the same time as maximal oxygen consumption. The acrophase of oxygen consumption occurred on the average about 3 hr after the middle of the daily dark span. Maximum insecticide sensitivity occurred about 2 hr earlier. Although the times are fairly close, the difference between the two acrophases was statistically significant. It is suggested that the possible involvement of a circadian or ultradian rhythm in acetylcholinesterase, the target of dichlorvos, should be considered.

79-0659. Kaloyanova, F. P.; Zapryanov, Z.; Baynova, A. I. (Inst. Hyg. & Occup. Dis., Med. Acad., Sofia, Bulgaria.) **Influence of the insecticide chlorodimeform of (sic) the activity of the monoamine oxidase (MAO) of albino rats.** *Dokl. Bolg. Akad. Nauk* 31(4): 491-493; 1978. (11 references)

Wistar albino rats were given chlordimeform at dose levels of 50, 10, and 5 mg/kg, introduced daily by gastric tube for a total of 40 applications. A significant decrease in monoamine oxidase (MAO) activity was noted in the liver and brain homogenates and in the serum. At 50 mg/kg, the various substrate forms of MAO activity in the liver of male rats decreased from the control figure for the kynuramine (AB) substrate of 0.627 to 0.341 μM/min/g fresh tissue. Similar reductions were noted for the tryptamine, tyramine, serotonin, dopamine, and benzylamine substrates as well. Chlordimeform inhibited the activity of MAO in the two organs which have the richest content of biogenic amines. The fact that the inhibition in MAO activity was dose dependent may be useful in determining cases of exposure among workers. While in previous studies the 5 mg/kg dose level was proposed as the noneffect level of chronic exposure for rats, this level had significant biological activity toward MAO. It is suggested that the probable mechanism for this inhibition of MAO function lies in the interference in the oxidative biotransformation, which accounts for enhanced values of a metabolite with high MAO inhibition activity.

79-0660. Oliver, J. M.; Krawiec, J. A.; Berlin, R. D. (Dep. Physiol., Univ. Connecticut Health Cent., Farmington, CT 06032) **A carbamate herbicide causes microtubule and microfilament disruption and nuclear fragmentation in fibroblasts.** *Exp. Cell Res.* 116(1): 229-237; 1978. (35 references)

Mouse 3T3 fibroblasts were grown and then exposed to CIPC (chlorpropham) to determine the effects of this chemical on the growth, morphology and distribution of microtubules and microfilaments of the fibroblasts, and on *in vitro* assembly and colchicine binding activity of bovine brain tubulin. Most of the experiments were conducted with 0.001 M CIPC. The study demonstrated that this widely used carbamate herbicide can impair growth, modify cell shape, perturb the microfilament system and cause the disappearance of microtubules in mouse 3T3 fibroblasts. The morphological responses were not apparent during the first 8 hr (acute) exposure of cells to the chemical. However, by 24 hr after addition of the chemical these responses are fully expressed. The inhibition of growth associated with impaired microtubule integrity in CIPC-treated 3T3 cells is reminiscent of the effects of CIPC *in vitro* on a variety of plant cells. The conclusion that CIPC may not be selective for plant systems implies a possible risk to persons who have been involved in the commercial use of the chemical or who have consumed crops containing residues of CIPC or IPC (propham)

79-0661. Glukhova, L. G.; Smoliar, L. S. (Dep. Pharmacol., Ternopol Med. Inst., Ternopol, USSR) **Reaktivnost' pecheni na vvedenie hlolevoi kisloty u krys, podvergavshikhsya dlitel'nomu vozdeistviyu polikhlorpinena. [Liver reaction of administration of cholic acid in rats exposed to a protracted action of polychloropinene.]** *Farmakol. Toksikol. (Moscow)* 40(3): 374-376; 1978. (8 references) (Russian)

The effect of cholic acid (10, 30 and 100 mg/100 g) on bile secretion was studied in 78 male rats with chronic toxic hepatitis induced by 1-mo or 3.5-mo intragastric treatment with polychloropinene (35 mg/kg/day, 0.10 of LD50) and in 9 healthy controls. In rats treated with 10 and 30 mg/100 g doses of cholic acid, the bile secretion dropped from 1,302±26 to 1,014±24 mg/100 g and to 1,032±36 mg, respectively, following treatment with polychloropinene for 1 mo. The bile secretion was not affected by cholic acid in the rats treated with polychloropinene for 3.5 mo. In the latter animals, the administration of cholic acid in a dose of 10 mg/100 g increased the bile acid concentration from 6,065 to 8,609 mg/100 g, without affecting the taurocholic acid concentration, but it increased the absolute and relative quantities of glycocholic and deoxycholic acids in the bile. Compared with the controls, cholic acid (10 mg/100 g) increased the cholesterol concentration in the bile of the rats treated with polychloropinene for 1 mo from 10.4 to 14.8 mg%, and the cholesterol secretion by 32%. The cholate-cholesterol coefficinent was 70.9-73.1 in the experimental rats, versus 56 in the controls. The findings indicate the mild choleretic effect of cholic acid, and the increase in the conjugation of free bile acids with glycine in rats with polychloropinene-induced toxic hepatitis.

79-0662. Stankevich, P. B. ; Korablev, M. V. (Dep. Pharmacol., Grodno Med. Inst., Grodno, USSR) **Izmenenie nekotorykh funktsiy zheludochno-kishechnogo trakta i pecheni zhivotnykh proizvodnymi ditiokarbaminovoi kisloty. [Changes in some functions of the gastrointestinal tract and liver of animals caused by dithiocarbamic acid derivatives.]** *Farmakol. Toksikol. (Moscow)* 41(5): 585-590; 1978. (13 references) (Russian)

The effects of TMTD (thiram), sodium *N,N*-diethyldithiocarbamate (SDEDC), *N,N*-dimethylthiocarbamic acid ethyl ester (DMTCEE), and zinc ethylene-*bis*-dithiocarbamate (ZEDTC, zineb) on some functions of the gastrointestinal tract and liver were studied in dogs, mice and rats. Single oral doses of 0.5-10 mg/kg of TMTD caused no significant change in the gastric secretion of dogs. The po administration of TMTD in daily doses of 10 mg/kg for 30 consecutive days caused a 20-35% increase in the gastric juice secretion, and a reduction in its pepsin content from 100% to 57%. All four compounds, administered in single 0.2 of LD50 doses intragastrically, caused a significant reduction of the 5-oxytryptophane-stimulated motor activity of the small intestine, indicated by the reduction of the diarrhea ($p < 0.05$) in mice. The compounds reduced the oxytryptophane decarboxylase activity by 22-55% without affecting the serotonine and 5-oxyindoloacetic acid levels in the intestine. All compounds, administered in single doses of 0.2 of LD50, reduced the glycogen-synthesizing and secretory functions of the liver in rats. SDEDC and DMTCEE reduced the detoxifying capacity of the liver, but TMTD and ZEDTC had no effect on this function.

79-0663. Koziz, M. B.; Wigowska-Sowinska, J. (Indep. Unit. Pathol. Nerv. Syst., Acad. Med., PL 60-355 Poznan, Poland) **Changes in the activity of hydrolytic enzymes in the brain of rats intoxicated by ethyl-mercury-*p*-toluene-sulfanilide.** *Folia Histochem. Cytochem.* 16(3): 263-270; 1978. (25 references)

Twenty adult Wistar rats were fed ig with 0.2 g of ethyl-mercury-*p*-toluene sulfanilide for 10 consecutive days. Degenerative changes were noted in the neurons of various regions of the rat brain. Massive neuronal losses were seen within the Ammon's horn. Distinctly reduced ATPase and acid phosphatase activities were noted in the exposed animals. Moderate declines were seen in the AChE activity. A definite rise in neuronal TPPase activity was observed along with a slight elevation of NsE activity. The pyramidal cells of the Ammon's horn as well as those of the second and fourth cortical layers of the frontal and parietal lobes demonstrated the highest vulnerability with respect to ethyl-mercury-*p*-toluenesulfanilide.

79-0664. Arai, H.; Shirai, T.; Hanonouchi, M.; Hirose, M.; Murasaki, G.; Ito, N. (First Dep. Pathol., Nagoya City Univ. Med. Sch., Nagoya 467 Japan) **Effect of protease inhibitors in mice treated with the hepatocarcinogen, hexachlorocyclohexane (alpha-isomer) and the bladder carcinogen, *N*-butyl-*N*-(4-hydroxybutyl) nitrosamine.** *Gann* 69(4): 593-595; 1978. (10 references)

DDY mice were fed a basal diet supplemented with 500 ppm α-BHC for 24 wk. Various protease inhibitors such as pepstatin, leupeptin, and antipain were added to the diets of various mice for an additional 12 wk. ICR mice were treated with *N*-butyl-*N*-(4-hydroxybutyl) nitrosamine (BBN) and protease inhibitors. These animals received 0.05% BBN in their drinking water. The incidence of liver nodular hyperplasia was significantly higher in the group treated with α -BHC and leupeptin than in the group treated with α-BHC alone. Pepstatin and antipain did not affect induction of liver nodular hyperplasias by α-BHC. The three protease inhibitors showed no effect on the induction of bladder tumors by BBN.

79-0665. Andersen, R. A.; Mikalsen, A. (Dep. Environ. Toxicol., Natl. Inst. Public Health, Oslo, Norway) **Solubilization of chicken brain cholinesterase, separation and characterization of molecular forms.** *Gen. Pharmacol.* 9(5): 335-340; 1978. (34 references)

Cholinesterase (ChE) of chicken brain cortex was easily solubilized. Ten percent was soluble in 0.05 M phosphate buffer. When treated with Triton X-100 (0.25% v/v) alone about 20% of the total activity was left particle bound. Not more than 5% was so left when treated with Triton X-100 in combination with 1 M sodium chloride. Polyacrylamide gel electrophoresis easily separated the two isozymes of ChE when used along with isoelectric focusing and sucrose gradient centrifugation. Subsequent studies performed to characterize the molecular forms suggest that multiple forms of brain ChE may be related to the aggregation of a single low molecular weight species.

79-0666. Istamov, Kh. I. (Inst. Gen. Genet., Acad. Sci. USSR, Moscow, USSR) **Cytogenetic action of certain defoliants and the insecticide methylmercaptophos.** *Genetika* 13(4): 621-626; 1977. (15 references)

Dry *Crepis capillaris* seeds were exposed to defoliants such as calcium cyanamide (cyanamid), magnesium chlorate, butyphos, and the insecticide methylmercaptophos (demeton-*o*-methyl) to determine the mutagenic action of these chemicals. All these chemicals induced different degrees of structural mutations of the chromosomes. An increase in the yield of chromosome aberrations was noted originally, which was maximized by treatment with a 2% sodium chlorate solution, 20% methylmercaptophos solution, and 10% butyphos solution. Further increasing of the concentrations of the substances decreased the yield of aberrations. No positive correlation was noted between the germination of the seeds and the concentration of the defoliants. When treated with calcium cyanamide, the maximum mutation frequency appeared at the lowest concentration. When the concentration was increased, there was a certain decrease in the percentage of mutations. Calcium cyanamide, magnesium chlorate, and methylmercaptophos induced more chromatid-type aberrations than chromosomal-type aberrations. Under the influence of calcium cyanamide and methylmercaptophos, with increasing concentration, the germination rate of the seeds dropped appreciably.

79-0667. Aleksandrovna, L. G.; Klisenko, M. A. (Kiev. Sci. Res. Inst. Occup. Saf. & Health, Kiev, USSR) **Nekotorye voprosy kinetiki nakopleniya i vyvedeniya tiokarbaminovykh pestitsidov iz organizma teplorkovnykh. [Some questions concerning the accumulation and removal of thiourea from warm-blooded animals.]** *Gig. Sanit.* 43(6): 101-103; 1978. (5 references) (Russian)

The accumulation and elimination of tillam (pebulate), yalan (molinate) and ronnit (cycloate), administered in single doses ig were studied in rats. High concentrations of yalan were found in the blood, liver, lungs, hearts, spleen, brain and kidneys 30 min after the administration of a dose of 300 mg/kg, but yalan was not detectable by TLC in these organs after 2 days. Slight accumulation of ^{14}C-labeled tillam was seen in the lungs, blood and liver following the administration of 0.164-1.95 mg/animal; 55% of the radioactivity was found in the exhaled CO_2, 23% in the urine, and 5% in feces. No residues were found in the organs after 3 days. After the administration of ronnit (1,000 mg/kg), the highest concentrations were found in the lungs, kidneys, liver, heart and spleen after 1 hr, and in the brain after 2 hr. A second maximum was found in the spleen and lungs after 3 hr. Ronnit was not found in the organs and blood after 24 hr. Tillam was detoxified rapidly in the body; only nontoxic metabolites were found in the urine. Four unidentified metabolites of yalan were found in all organs 0.5-24 hr after administration. Cyclohexylamine and dicyclohexylamine were identified as metabolites of ronnit in the urine.

79-0668. Vitvitskaya, B. R.; Arsen'eva, M. V. (I. M. Sechenov First Moscow Med. Inst., Moscow, USSR) **Gigienicheskoe obosnovanie predel'no dopustimykh kontsentratsi y sul'fidofosa i ego poluprodukta metiltiometifenola v vode vodoemov. [Hygienic substantiation of maximum permissible concentrations of sulfidophos and its intermediate methylthio methylphenol in water bodies.]** *Gig. Sanit.* 43(8): 10-13; 1978. (5 references) (Russian)

The toxicological and environmental characteristics of sulfidophos (SP, fenthion) and its intermediate, methylthio methylphenol (MTMP) were studied to substantitate their maximum permissible levels in water bodies. The lowest concentrations in which SP and MTMP altered the smell of water were found to be 0.001 mg/l and 0.01 mg/l, respectively. The lowest concentrations in which they reduced the biochemical oxygen demand were 1.25 mg/l for SP and 0.1 mg/l for MTMP. The acute LD50 of MTMP was 1,000 mg/kg in albino mice, 3,400 mg/kg in albino rats, and 3,500 mg/kg in guinea pigs. The corresponding values found for SP were 160, 215 and 400 mg/kg, respectively. SP was found to have marked, and MTMP slight cumulative effect. The highest ineffective doses established in the experimental animals were 1.7 mg/kg for MTMP, and 0.1 mg/kg for SP. The findings indicate that the maximum permissible concentrations in water should be set on the basis of the effects of these substances on the organoleptic properties; the recommended maximum permissible concentrations are 0.001 mg/l for SP, and 0.01 mg/l for MTMP.

79-0669. Mackrell, J. A.; Walker, J. R. L. (Bot. Dep., Univ. Canterbury, Christchurch, New Zealand.) **The biodegradation of quaternary ammonium compounds.** *Int. Biodeterior. Bull.* 14(3): 77-83; 1978. (29 references)

The metabolism of quaternary ammonium compounds (QAC's) by soil microorganisms was investigated using microorganisms capable of degrading QAC's, sought by selective enrichment culture from local river waters, mud, soil, and from sewage sludge. All attempts to isolate microorganisms capable of utilizing QAC's as sole source of carbon for growth by enrichment culture were unsuccessful. The failure to detect QAC-degrading microorganisms from a wide range of environments suggests that QAC's should be considered as relatively recalcitrant molecules. Short chain QAC's such as TMA (tetramethyl ammonium chloride) and ETMA (ethylmethylammonium chloride) could support bacterial growth. However, the next higher homologue TEAB could not, perhaps due to the close-packed tetrahedral structure which protects the central nitrogen atom. The biochemical recalcitrance of long-chain QAC's may be due in part to the presence of the basic quaternary structure in the same way that the branched chain alkyl-benzyl-sulphonates are resistant to microbial degradation. However, it is noted that the quaternary nitrogen structure is not completely resistant to biochemical attack.

79-0670. Frear, D. S.; Swanson, H. R.; Mansager, E. R.; Wien, R. G. (Metab. & Radiat. Res. Lab., Sci. & Educ. Adm., USDA, Fargo, ND 58102) **Chloramben metabolism in plants: isolation and identification of glucose ester.** *J. Agric. Food Chem.* 26(6): 1347-1351; 1978. (26 references)

A reported chloramben-X conjugate in giant foxtail (*Setaria* sp.) was purified and identified as methyl 3-amino-2,5-dichloro benzoate (chloramben methyl ester). Additional studies established that the chloramben methyl ester was an artifact formed by transesterification of an unknown ester metabolite during the clean up of methanol extracts on Florisil columns. The unknown metabolites was isolated from [*carboxy*-^{14}C] chloramben-treated giant foxtail and barley (*Hordeum vulgare* L.) seedling tissues and identified as the glucose ester, α-D glucosyl 3-amino- 2,5-dichloro benzoate. Differential metabolism studies with excised tissues of chloramben-sensitive and tolerant seedlings suggested that levels of the glucose ester metabolite, the previously identified *N* -glucoside conjugate, and the bound chloramben residues were significant factors in chloramben phytotoxicity and selectivity. (Author abstract reprinted by permission of the American Chemical Society).

79-0671. Ku, C. C.; Kapoor, I. P.*; Rosen, J. D. (Agric. Div., Am. Cyanamid Co., Princeton, NJ 08540) **Metabolism of Cytrolane (mephosfolan) systemic insecticide [(diethoxyphosphinyl) dithioimidocarbonic acid, cyclic propylene ester] in a simulated rice paddy.** *J. Agric. Food Chem.* 26(6): 1352-1357; 1978. (10 references)

The metabolic fate of [^{14}C]mephosfolan systemic in-

secticide (Cytolane, a registered trademark of American Cyanamid Company) in rice plants grown in a paddy environment has been studied. Of the 50% extractable radioactivity, more than 45% was identified as mephosfolan. The remaining 5% was due to a mixture of at least 17 metabolites. The unextractable radioactivity has been characterized as ^{14}C-labeled cellulose and possibly lignin. The results indicate that mephosfolan does not accumulate in the rice grain. The radioactive residue found in the rice grain was characterized as ^{14}C-labeled starch due to the incorporation of the ^{14}C-imido carbon atom of mephosfolan into glucose and, subsequently, into the starch. Although only mephosfolan was found in paddy water, its concentration in water decreased at a rapid rate due to its degradation by the rice plant, fish, and other living organisms in the paddy ecosystem. (Author abstract reprinted by permission of the American Chemical Society)

79-0672. Vasic, B. V.; Milosevic, M. P.; Terzic, M. R. (Dep. Pharmacol., Fac. Stomatol., Univ. Belgrade, Belgarde, Yugoslavia) **Acetylcholine and cholinesterase in submandibular glands of rats given armin and obidoxime.** *J. Dent. Res.* 57(5-6): 748-751; 1978. (17 references)

Albino rats were injected subcutaneously with 0.4 mg/kg armin (armine), or 25 mg/kg of obidoxime dichloride, or armin followed 5 min later by obidoxime dichloride. Suriving rats were sacrificed 55 min after the armin or obidoxime injection. Others were decapitated immediately after ventilatory activity stopped. The armin exposure produced a marked inhibition of cholinesterase in the submandibular gland (70%) and a significant, 40%, increase in the concentration of acetylcholine within the gland. Salivation and other signs of intoxication caused by organophosphorus compounds were noted. The injection of obidoxime at 5 min after armin administration prevented the increase in acetylcholine within the gland and caused a high degree of reactivation of cholinesterase, 82%. The decrease in accumulation of acetylcholine after obidoxime administration seems related to reactivation of cholinesterase in the gland.

79-0673. Feinstein, R. N.; Fry, R. J. M.; Staffeldt, E. F. (Div. Biol. & Med. Res., Argonne Natl. Lab., Argonne, IL 60439) **Comparative effects of aminotriazole on normal and acatalasemic mice.** *J. Environ. Pathol. Toxicol.* 1(6): 779-789; 1978. (45 references)

Male and female mice of the C3H/Cs*a*, C3H/cs*b*, C57BL/Cs*a*, and C57BL/Cs*b* were fed 3-amino- 1,2,4-triazole (amitrole; AT) which had been incorporated at 1% (by weight) into standard Purina mouse chow. Some mice were exposed by injection. Treatment with AT either by incorporation in the diet by injection did not effect blood catalase activity. However, AT did have a strong inhibitory effect on the catalytic activity of the liver and other solid tissues. Both C3H substrains were more greatly affected by AT in the diet than were the C57BL animals. When mice were injected with a dose of 2000 mg AT/kg, the liver catalase of all strains was strongly inhibited to a comparable degree. The acatalasemic substrains were more resistant to weight loss and death than were the normal catalase counterparts. Mice, consuming the same amount of either the normal or AT-containing diet, gained much more weight on the normal diet. Temporary consumption of the AT diet caused a considerable increase in thyroid weight, with an extremely slow, and only partial, return to normal weight. A scaly, necrotic tail was noted to developed on C3H/Cs*a* mice on the AT-treated diet. The lesion was not noted in the acatalasemic mice on the same diet.

79-0674. Milman, H. A.; Ward, J. M.; Chu, K. C. (Toxicol. Branch. Carcinog. Testing Program, NCI, NIH, Bethesda, MD 20014) **Pancreatic carcinogenesis and naturally occurring pancreatic neoplasms of rats and mice in the NCI carcinogenesis testing program.** *J. Environ. Pathol. Toxicol.* 1(6): 829-840; 1978. (18 references)

A two year rodent bioassay study was conducted to determine the carcinogenicity of various chemicals in rats and mice. Of the 200 chemicals tested only nitrogen produced a statistically significant elevation of neoplasms of exocrine pancreas in Osborne-Mendel rats. The incidence of the neoplasm was low, 14% at the highest dose tested, and was confined to the pancreas of female rats only. Only one chemical, azinophos-methyl tested *in vivo*, produced a significant increase in the incidence of neoplasms of the endocrine pancreas in rats or mice. It is suggested that the Osborne-Mendel or Fischer 344 male rat may be a sensitive model for the detection of islet-cell, but not exocrine, tumors produced by chemicals.

79-0675. Mull, R. L.; Winterlin, W. L.; Peoples, S. A.; Ocampo, L. (Toxicol. Eval. Div., Lederle Lab., Pearl River, NY 10965) **Hexachlorobenzene I. Uptake, distribution and excretion of hexachlorobenzene (HCB) in growing lambs.** *J. Environ. Pathol. Toxicol.* 1(6): 865-878; 1978. (25 references)

Young, castrated male lambs were exposed for 90 day periods to HCB (hexachlorobenzene) at dietary concentrations of 0, 0.01, 0.1, or 1.0 ppm. Biopsies were taken on treated sheep at days 7, 15, 30, 45, and 60, and every 30 days thereafter through day 300. The growth rate was not affected by dietary HCB exposure. Adipose tissue concentrations of HCB reached a level ten times that in the diet by the end of the 90 day exposure period. The omental fat contained higher concentrations of HCB residues than did the perirenal fat at 90 days, but not at 300 days. The apparent decrease in HCB in the fat following cessation of exposure was due to dilution brought about by increasing amounts of fat in the carcass. The half-life of HCB appeared to be about 90 days, and was not dose-dependent at these rates. The highest HCB concentrations in other tissues occurred in the brain and liver.

79-0676. Nelson, C. J.; Holson, J. F. (Div. Biom., Natl. Cent. Toxicol. Res., Dep. HEW, Jefferson, AR 72079) **Statistical analysis of teratologic data: problems and advancements.** *J. Environ. Pathol. Toxicol.* 2(1): 187-199; 1978. (13 references)

Random bred CD1 mice and 4 inbred strains (C3H/he, C57BL/6, BALB/c, and A/J) were given 2,4,5-T daily from day 6 through day 14 of pregnancy at dose levels ranging from 15 to 120 mg/kg. Data are presented on mating, fecundity, and fetal viability. The expected percentage of animals in the receptive phase of the estrus cycle should have been about 25%. However, the values ranged from a low of 6% for C3H/he to a high of 31% for the BALB/c strain. Statistics on the pregnancy to plug ratio indicate that BALB/c had the lowest percentage with 18% and C3H/he the highest with 86%. The pregnant/mated ratio was 5 for C3H/he and 6 for BALB/c. The highest pregnancy rate was noted in CD1 mice at 14.8%. C3H/he animals had the smallest average litter size and CD1 animals the largest. The standard deviation of the replicate means averaged over all replicates was 0.6 fetuses for C3H/he and 2.1 fetuses for CD1. BALB/c had the highest standard deviation of the replicate means, 2.2 fetuses. It is concluded that at least 3 replicates with appropriate numbers of pregnant animals are needed to estimate variance for comparison among labs or among species. The usefulness of these calculations for standardizing teratologic studies is discussed.

79-0677. Golder, T. K.; Nieberg, P. S.; Wilson, B. W. (Int. Cent. Insect Physiol. & Ecol. Nairobi, Kenya) **Ultrastructural localization of acetylcholinesterase in cultured cells. III. DFP treated embryo muscle.** *J. Histochem. Cytochem.* 26(9): 719-728; 1978. (36 references)

Studies were conducted on acetylcholinesterase (AChE) inhibition and recovery in chick muscle after treatment with diisopropyl fluorophosphate (DFP). Pectoral muscle cells from 11-day chick embryos were incubated with 10 μM DFP for 10-15 minutes. AChE was assayed spectrophotometrically and localized by electron microscopy. Immediatly following DFP treatment, the large myotubules exhibited no AChE activity. Fifteen min after treatment, slight activity was detected in the sarcotubular system and nuclear envelope. During the first hr, there was a great increase in activity in the nuclear envelope. By the fourth hr after treatment, activity was close to that of the controls.

79-0678. Tan, L. P.; Ng, M. L.; Das, V. G. K. (Dep. Biochem., Fac. Med., Univ. Malaya, Pantai Valley, Kuala Lumpur 22-11, Malaysia) **The effect of trialkyltin compounds on tubulin polymerisation.** *J. Neurochem.* 31(4): 1035-1041; 1978. (16 references)

Trialkyltins (such as triethyltin, trimethyltin and triphenyltin) were used at concentrations ranging between 10 and 100 μM to study their effects on tubulin polymerization. Viscometric studies indicate that these concentrations inhibited the *in vitro* polymerization of tubulin as well. Both of these effects were concentration dependent. No interference was noted with the *in vitro* preassembled microtubules. These results support the theory that trialkyltin compounds cause depletion of the neurotubules in the axons of isolated neuromuscular preparations probably by interfering with the assembly of neurotubules *in vivo*.

79-0679. Colburn, W. A. (Lab. Pharmacokinet., NIEHS, Research Triangle Park, NC 27709) **A model for the dose-dependent pharmacokinetics of chlorophenoxy acid herbicides in the rat: the effect of enterohepatic recycling.** *J. Pharmacokinet. Biopharm.* 6(5): 417-426; 1978. (13 references)

A two compartment open model was used to study the time course of chlorophenoxy acid herbicides in the rat. The model included enterohepatic circulation and saturable unidirectional renal excretion. Physiological processes known to occur *in vivo* are included. Compounds such as 2,4-D, 2,4,5-T, and 2,4,5-TCPPA (2-[2,4,5-trichlorophenoxy] propionic acid) can be studied via this method in the plasma, urine, and bile of rats. The model assumes that saturable renal transport and extensive enterohepatic circulation are operative during the distribution and elimination of such chemicals. A comparison of the predicted plasma concentrations and urinary and biliary excretion rates with those reported previously in the literature served to validate the method. By use of this model one can predict changes in plasma and urinary elimination during bile duct cannulation. It is suggested that the nonlinear elimination of these chemicals is dramatically influenced by enterohepatic circulation.

79-0680. Flugel, M.; Geldmacher-von Mallinckrodt, M. (Chir. Universitatsklin. Poliklin. D-8520 Erlangen, BRD) **Zur Kinetik des Paraoxon-spaltenden Enzyms im menschlichen Serum (EC 3.1.1.2). [Kinetics of the paraoxon hydrolysing enzyme in human serum (EC 3.1.1.2).]** *Klin. Wochenschr.* 56(18): 911-916; 1978. (26 references) (German)

The polymorphism of the human serum enzyme which hydrolyzes paraoxon (paraoxonase) was studied in 6 healthy adults (4 men and 2 women). Groups of two each were made according to their paraoxonase activity. The paraoxonase activity was studied by determining the Michaelis constant for paraoxon alone, or for paraoxon in the presence of similar compounds. The Michaelis constant was highest in the persons with low paraoxonase activity (12.44 and 18.30), lower in the persons with low paraoxonase activity (6.46 and 8.09), and lowest in those with high enzyme activity (3.19 and 3.29). The findings show that the polymorphism of the enzyme is due to qualitative differences of the paraoxonases in the three groups. Paraoxon, methyl-paraoxon and chloromethyl paraoxon were most probably hydrolyzed by the same enzyme and in the same way; *n*-propyl- paraoxon seemed to be hydrolyzed by a different enzyme. The hydrolysis of paraoxon is competitively inhibited by S-substituted analogs of paraoxon, but it is not influenced by the addition of singly or doubly dealkylated derivatives of paraoxon or of compounds in which the nitro group is not in the *p*-position. The findings indicate that persons occupationally exposed to parathion should be investigated for paraoxonase activity, and those with low activity should be monitored carefully.

79-0681. Das, B.; Singh, P. K. (Lab. Blue-green, Algae, Cent. Rice. Res. Inst., Cuttack 753006, Orissa, India) **Mutagenicity of pesticides in blue-green algae.** *Microbios Lett.* 5(19): 103-107; 1977. (19 references)

To study the induction of possible mutagenesis, blue-green algae, *Anabaenopsis raciborskii, Anabaena aphanizomenoides, Anabaena spiroides,* and *Microcystis flos-aquae,* were treated with BHC and 2,4,-D at concentrations of 100 and 1,000 μg/ml, respectively, for 8 hr. Neither BHC nor 2,4-D were efficient inducers of morphological variants in these algae although a slight increase in mutation frequency was noted after BHC treatment. BHC was highly toxic to the algae.

79-0682. Taniguchi, Y.; Nishibe, T.; Tsubura, Y. (Sch. Pathol. II, Nara Prefect. Med. Univ., Nara, Japan) **[Toxicity test of *p*-chlorophenyl *p*-chlorobenzene sulfonate. Part. 1. Acute oral toxicity in BDF_1 mice.]** *Nara Igaku Zasshi (J. Nara Med. Assoc.)* 29(3): 534-538; 1978. (3 references) (Japanese)

BDF_1 mice were tested for acute oral toxicity of *p* -chlorophenyl *p*-chlorobenzene sulfonate (over). The LD50 was found to be over 4000 mg/kg for both males and females. Toxic effects were evident at 2000 mg/kg for both sexes. The maximum non-effect level was less than 1000 mg/kg. The symptoms of intoxication were impairment of respiration accompanied by spasms. The only histological change noted in some treated animals was hemorrhage of the spleen.

79-0683. Alexander, M.; Cook, A. M.; Daughton, C. G. (Cornell Univ., Ithaca, NY) **Induction of microbial metabolism of organophosphorus compounds.** *Natl. Tech. Inform. Serv.* AD-A054,019: 29p.; 1977. (17 references)

Bacterial cleavage of the carbon-phosphorus bond was investigated. Bacteria were isolated that were capable of growing with one or more organophosphonates as sole sources of phosphorus. Cleavage of the C-P bond was shown for *Pseudomonas putida* growing with 2-aminoethylphosphonate and for *Pseudomonas testosteroni* growing with isopropyl hydrogen methylphosphonate, pinacolyl hydrogen methylphosponate or dihydrogen methylphosphonate as sole phosphorus sources. Various metabolites were identified by gas chromatography and mass spectrometry. (Author abstract by permission)

79-0684. Kolaja, G. J.; Hinton, D. E. (Chem. Syst. Lab., Army Armament Res. & Dev. Command, Aberdeen Proving Ground, MD) **Ultrastructural alterations in the eggshell gland epithelium of the Mallard duck after chronic exposure to DDT.** *Natl. Tech. Inform. Serv.* AD-A054,732: 14p.; 1978. (17 references)

This study was conducted to determine what effects the chronic ingestion of DDT would have on the ultrastructure of the egghsell gland of the mallard duck. The ultrastructure changes seen were edema of the type II epithelial cells as demonstrated by decreased electron density and vacuoles in the endoplasmic reticulum. Since the type II cells are responsible for the transport of calcium, alterations in these cells indicate that decreased calcium transport may be responsible for DDT-induced eggshell thinning. (Author abstract by permission)

79-0685. Carcinog. Program, NCI, Bethesda, MD 20014 **Bioassay of malathion for possible carcinogenicity.** *Natl. Tech. Inform. Serv.* PB-278,527: 98p.; 1977. (18 references)

A bioassay of technical-grade malathion for possible carcinogenicity was conducted by administering the test chemical in feed to Osborne-Mendel rats and B6C3F1 mice. Groups of 50 rats of each sex were administered malathion at one of two doses for 80 wks. Time-weighted average doses were 4,700 or 8.150 ppm. Matched controls consisted of groups of 15 untreated rats of each sex; pooled controls were also used. Groups of 50 mice of each sex were administered malathion at one of two doses, either 8,000 or 16,000 ppm for 80 wk. Matched controls consisted of groups of 10 untreated mice of each sex; pooled controls were also used. In rats, the incidence of thyroid tumors was increased but was not significant when compared to controls. In male mice, hepatocellular carcinoma occurred but these liver tumors were not considered to be associated with the administration of malathion. It is concluded that under the conditions of this bioassay, there was no clear evidence of the association of the occurrence of tumors with the administration of malathion to Osborne-Mendel rats or B6C3F1 mice. (Author abstract by permission)

79-0686. Carcinog. Program, NCI, Bethesda, MD 20014 **Bioassay of emetine for possible carcinogenicity.** *Natl. Tech. Inform. Serv.* PB-278,891: 103p.; 1977. (23 references)

A bioassay of emetine, an amebicide and anticancer drug, for possible carcinogenicity was conducted by administering the test material by ip injection to Sprague-Dawley rats and B6C3F1 mice. Groups of 35 rats of each sex were administered emetine at one of two doses, either 0.5 or 1 mg/kg body weight, three times per wk for 52 wk. Control groups of each sex consisted of 10 untreated rats and 10 rats injected with buffered saline. Initially, groups of 35 mice of each sex were administered emitine at one of two doses, either 3.2 or 6.4 mg/kg body weight three times per wk. Due to high mortality rates in the initial treated groups, additional groups of 35 mice of each sex were later put on study at 1.6 mg/kg, together with 10 untreated-control and 10 vehicle-control mice of each sex. Treatment duration varied from 28 to 52 wk. No tumors occurred at a stistically significant incidence in either rats or mice. However, it should be noted that in this study, treatment of both species was stopped earlier than in current bioassays. In addition, there was poor survival among the treated mice. It is concluded that the results of this study do not allow evaluation of the possible carcinogenicity of emetine. (Author abstract by permission)

79-0687. Carcinog. Program, NCI, Bethesda, MD 20014 **Bioassay of Aroclor 1254 for possible carcinogenicity.** *Natl. Tech. Inform. Serv.* PB-279,624: 69p.; 1977. (26 references)

A bioassay of Aroclor 1254 for possible carcinogenicity was conducted by administering the test chemical in feed to Fischer 344 rats. Groups of 24 rats of each sex were administered Aroclor 1254 at one to three doses, either 25, 50, or 100 ppm, for 104-105 wk. Matched controls con-

sisted of groups of 24 untreated rats of each sex. Survival among males, but not among females, showed a significant dose-related trend. Adequate numbers of animals of both sexes survived for meaningful statistical analyses of the incidences of tumors. The combined incidences of lymphomas and leukemias showed a significant dose-related trend in males. However, the direct comparisons of each treated group with those of the matched controls were not significant, and the tumors cannot clearly be related to treatment with Aroclor 1254. Hepatocellular adenomas and carcinomas were found in the treated groups, but not in the controls. Although the incidences of tumors were not significant, the occurrence of the hyperplastic nodules appeared to be related to treatment. It is concluded that under the conditions of this bioassay, Aroclor 1254 was not carcinogenic in Fischer 344 rats; however, a high incidence of a spectrum of proliferative lesions of the liver in both male and female rats was related to treatment. In addition, the carcinomas of the gastrointestinal tract may be associated with treatment in both males and females. (Author abstract by permission)

79-0688. Malakhov, S. G.; Duttweiler, D. W. (Environ. Res. Lab., Athens, GA) **Symposium on environmental transport and transformation of pesticides: joint US-USSR project 02.03-31, 'Forms and Mechanisms by which pesticides and chemicals are transported.'** *Natl. Tech. Inform. Serv.* PB-280,714: 250p.; 1978. (12 references)

Under the USA-USSR Agreement on Cooperation in the Field of Environmental Protection, a joint project committee on environmental transport of agricultural chemicals (pesticides and fertilizers) sponsored a symposium on 20-27 October 1976 in Tbilisi, USSR. Papers were presented by American and Soviet scientists on the movement and transformations of pesticides in the atmosphere, in soils, in water, in paints, and in animals, and on the use of mathematical modeling to describe the transport and transformation of pesticides in the environment. Twenty-six papers encompassed reviews of the state of the art in each country and results of research on particular aspects of the topics. (Author abstract by permission)

79-0689. Hwang, E. C.; Von Woert, M. H. (Dep. Neurol., Mount Sinai Sch. Med., New York, NY) ***p,p'*-DDT-induced neurotoxic syndrome: experimental myoclonus.** *Neurology* 28(19): 1020-1025; 1978. (24 references)

An animal model of myoclonus was studied to determine whether it would have pharmacologic and biochemical similarities to either human intention myoclonus or to the animal serotonergic-myoclonic syndrome. The mice studied were given an intragastric injection of *p,p'*-DDT at a dose level of 600 mg/kg. Within 1.5 to 2 hr they developed generalized fine tremors, followed by generalized arrhythmic myoclonic movements. After 3 hr arrhythmic myoclonus was predominant and was aggravated by noise or tactile stimuli, which persisted unchanged for the next 2 to 3 hr. The animals died 5 to 7 hr after *p,p'*-DDT was given. In many cases death was preceded by major motor seizures. Lower doses of *p,p'*-DDT also produced myoclonus with a lower incidence of seizures and mortality. The myoclonus observed in the rodents was similar to the intention myoclonus seen in patients after toxic brain damage or oxygen deprivation. Agents which enhance serotonin action consistently reduced the myoclonus, while serotonin antagonists aggravated the myoclonus, suggesting that a deficiency of serotonergic activity in the brain may be responsible for *p,p'*-DDT induced myoclonus. The dramatic remission of myoclonus jerking for 5 to 7 min after intracisternal injection of serotonin supports this hypothesis.

79-0690. Saito, S.; Hoshino, M.; Kotake, K.; Taniguchi, K.; Namba, H.; Miyazawa, E.; Tamura, K. (Sch. Pharmacol., Fac. Med., Nippon Univ., Tokyo, Japan) **[General pharmacological action of polyoxin B.]** *Nichidai Igaku Zasshi (Nippon Univ. Med. J.)* 37(8): 883-897; 1978. (Japanese)

The general pharmacological activities of Polyoxin B, one of the polyoxins biosynthesized by *Streptomyces cacaoi* var. *asoensis*, not utilized as a fungicide were studied in several experimental animals. The action on the central nervous system showed only the slight slowing of EEG waves in rabbits (at 1 mg/kg, iv) and the suppression of spontaneous movements in mice (at 40 mg/kg, ip). Polyoxin B did not produce remarkable changes in blood pressure and ECG of dogs, however, their respiratory frequency and tidal volume showed a transient increase, and their blood flow showed a transient resuction at doses of 10 - 50 mg/kg, iv. No effects were observed on excised frog vessels. No effects of the fungicide were observed on the smooth muscles of several isolated organs, such as trachea, blood vessels, atrium, stomach, ileum, uterus and urinary bladder of rabbits and guinea pigs. Polyoxin B showed no antagonistic activities for acetylocholine, atropine, histamine, or serotonin. In general, present studies revealed no significant pharmacological activities of Polyoxin B on the function of various organs of mammals.

79-0691. Miyazawa, E.; Tokunaga, Y. (Sch. Pharmacol., Fac. Med., Nippon Univ., Tokyo, Japan) **[Appearance of toxicity in rats administered with polyoxin D for 2 years.]** *Nichidai Igaku Zasshi (Nippon Univ. Med. J.)* 37(9): 1122; 1978. (Japanese)

Chronic toxicity testing of Polyoxin D on 7-wk-old Wistar rats was performed. In the 2 yr experiment, rats were fed diets containing 0.01, 0.1, 1.0, or 5% Polyoxin D. Some animls were sacrificed at 6, 12 and 18 mo to determine the short-term effects of the antibiotic pesticide. Body weight gain, food consumption, urinalysis, blood and serum biochemical examinations, and the appearance and histology of the organs showed no changes that could be attributed to the pesticide dosing. However, at the end of the long-term experiment, remarkable changes of each organ and in the endocrine system were observed. Spontaneous tumors were also noted, in both the treated and control animals, and were attributed to aging.

79-0692. Hoshino, M.; Tokunaga, Y. (Sch. Pharmacol., Fac. Med., Nippon Univ. Tokyo, Japan) **[Chronic toxicity test on polyoxin D- zinc salt administered to mice for 24 months.]** *Nichidai Igaku Zasshi (Nippon Univ. Med. J.)* 37(9): 1122; 1978. (Japanese)

Four groups (30 animals) of ICR mice of both sexes were fed with feeds containing 0, 0.04, 0.4, and 4% of the zinc salt of Polyoxin D, an antibiotic fungicide, for 24 mo. In the course of the chronic toxicity test, some animals were killed at 6, 12 and 10 mo to examine the effects of the fungicide on general appearance, body weight, feed consumption, blood, urine, organ weights, and organ histology. As a result of the long term experiment, death, atrophy of the kidney, ovarian tumors, ovarian hydrops, atrophy of testis, and sedimentation of pigments in the liver, spleen, kidney, and intestines were observed in both experimental and control animals. These effects were considered to be due to hypernutrition and aging rather than the administration of the fungicide. No remarkable findings due to the long-term administration of the zinc salt of Polyoxin D were observed.

79-0693. Kotake, K.; Tokunaga, Y. (Sch. Pharmacol., Fac. Med., Nippon Univ., Tokyo, Japan) **[Effects of Polyoxin D- zinc salt on the next generation of rats.]** *Nichidai Igaku Zasshi (Nippon Univ. Med. J.)* 37(9): 1122-1123; 1978. (Japanese)

Teratogenicity and fertility tests of the zinc salt of Polyoxin D (an antibiotic fungicide) were carried out using both sexes of Wistar rats fed with feeds containing 0.01 and 1% of the fungicide over three generations. Mating, conception, delivery, and nursing in each generation were comparable, with no significant change over the generations in the number of offspring. In short, no effect of the fungicide was found on the body weight gain of both sexes of parents or their progeny in each generation. However, a tendency towards slight decrease in body weight was seen towards the later generation. No remarkable anomalies were found in the offspring. In general, the administration of the zinc salt of Polyoxin D over three generations showed no effect on the fertility of rats and no teratogenic effects to their offspring.

79-0694. Horiguchi, Y.; Asanuma, N.; Abe, E.; Kurosawa, K.; Sasaki, K.; Suzuki, A. (Jpn. Inst. Rural Med., Usuda, Nagano, Japan) **[Effects of leptophos on mammals.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(2): 203; 1978. (Japanese)

Leptophos (Phosvel), was administered orally in a single dose at levels of 0, 5, 10, 15, and 20 mg/kg to 5 groups of rats. Residual amounts of leptophos in adipose tissue were determined 5, 10, and 20 days after leptophos administration. Results were compared with values from control rats and with values from rats given oral doses of fenitrothion at 100 and 300 mg/kg. Body weights of the rats given leptophos showed reductions on the first and second day after dosing, and from there on, a tendency to increase. No neuropathological symptoms were observed. Residues of fenitrothion became undetectable by the 10th day after administration, however, leptophos residues could be detected even on the 20th day after dosing. Two rhesus monkeys given oral doses of 5 or 10 mg/kg of leptophos every 10 days showed the lowest level of whole blood ChE on the first day after dosing, then gradual recovery thereafter. However, they did not completely recover to normal levels of ChE after the second administration of the pesticide. The monkey given 10 mg/kg showed an appearance of slow wave by the fifth day after the first dosing. No other neuropathological symptoms or changes in body weight were observed in the two rhesus monkeys.

79-0695. Hirai, K.; Shiaku, K.; Okuda, T. (Second Sch. Biochem., Fac. Med., Ehime Univ., Matsuyama, Ehime, Japan) **[Studies on the effect of fenitrothion toward the metabolism of lipids.]** *Nippon Noson Igakkai (Jpn. J. Rural Med.)* 27(3): 448-449; 1978. (Japanese)

Since it was found that serum cholinesterase activity changes with the lipids in serum in a positive correlation, the possibility of organophosphorus insecticides affecting the metabolism of lipids was examined *in vitro* and *in vivo* using a concentrated EC of fenitrothion (about 80%). It was found that fenitrothion inhibited serum cholinesterase when this enzyme's activity was tested using benzoylcholine as substrate by Histerin's method. Non-specific esterase was also inhibited as determined by using tributyline as substrate, as was adipose tissue lipase as determined by using homogenated adipose tissue of rat epididymis plus sucrose as substrate. There was also an inhibition of lipoprotein lipase when tested on post-heparin plasma as substrate. When rabbits were given oral doses of 100 mg/kg fenithrothion twice at interval of 30 min, serum cholinesterase was clearly reduced, however, inhibition of lipoprotein lipase was observed in only 3 out of 5 animals. [At the 27th annual meeting of the Japanese Society for Rural Medicine.]

79-0696. Yatomi, T.; Ueda, K.; Oikawa, K.; Kawai, M. (Sch. Oral., Fac. Odontol., Showa Univ., Tokyo, Japan) **[Delayed neurotoxicity of organophosphorus compounds. Part II.]** *Nippon Nosho Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 622-623; 1978. (Japanese)

In order to study the relationship between the chemical structure and delayed toxicity of organophosphorus compounds, tri-*o*-cresyl phosphate (I), leptophos (II), 2,5-dichlorophenyl methyl phenylphospono thioate (III), 2,4,5-trichlorophenyl methyl phenylphosphono thioate (IV), EPN (V), and methyl *p*-nitrophenyl phenylphosphonothioate (VI) were given orally in dosages of 200, 200, 100, 100, 50, and 100 mg/kg, respectively to adult hens. Atropine (50 mg/kg) was administered im to the hens to which compounds V and VI were given to save the hens' lives. The birds which survived until the 21th day after organophosphorus administration were sacrificied and nerve tissue was excised to be examined for histopathology. The birds given compounds I, II, III, and IV showed a slight acute intoxication after administratino of the pesticides with recovery on the second day. However, from the 7th day they began to show abnormal

walking, difficulty in walking, inability to stand, and abnormal wing motion. The birds given EPN did not show these delayed neurotoxic symptoms during the 21 day period. The birds given compound VI showed a severe acute intoxication, however, the symptoms disappeared by forced administration of water. With repeated administration of EPN, the birds showed impaired walking. These results indicate that leptophos, its de-Br compound, and its Cl-substituted compound all induce active neurotoxicity. Therefore, it was concluded that the introduction of the bromine atom into the phenyl radical is not the cause of the neurotoxicity of leptophos. [At the 27th annual meeting of the Japanese Society for Rural Medicine.]

79-0697. Matsushima, S.; Abe, E.; Sasaki, K.; Kurosawa, K. (Jpn. Inst. Rural Med., Usuda, Nagano, Japan) **[Long-term low-dose administration of fenitrothion to dogs and monkeys. Part II.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 624-625; 1978. (Japanese)

Fenitrothion was administered to adult beagles at 2 mg/kg/wk, and to rhesus monkeys at 1, 2, and 4 mg/kg/wk for 36 mo. Observations made of these animals showed all the dogs to be normal. One male monkey receiving 4 mg/kg/wk of fenitrothion died due to pneumonia after 35 mo. One male monkey who was receiving 1 mg/kg/wk of fenitrothion had perforation of a stomach ulcer and died after 36 mo. One female monkey suffered from occasional diarrhea due to a chronic non-infectious intestinal disorder, however, the other monkeys appeared normal, and their weight gain was the same as that of the controls. Upon examination of the blood, RBC, WBC, hemoglobin, hematocrit, value, and platelet counts were normal in both dogs and monkeys. Upon serum chemical examination, total protein albumin, GOT, GPT, total cholesterol, BUN, alkaline phosphatase, blood sugar, Ca, Na, and Cl were found to be normal. Serum and erythrocyte cholinesterase activities showed no changes in dogs, however, erythrocyte cholinesterase activity of the fenitrothion-treated monkeys decreased with increasing pesticide dosage. A marked myopia appeared in the fenitrothion-treated dogs at 20-30 mo but after 36 mo there was no difference of refraction between experimental and control groups. Male monkeys receiving fenitrothion in doses of 4 mg/kg/wk showed a tendency toward myopia from the second mo on, but one of these recovered and the other died. A fundus tabulatus was noted in three monkeys of the 4 mg/kg/wk dose group. [At the 27th annual meeting of the Japanese Society for Rurual Medicine.]

79-0698. Horiguchi, Y.; Asanuma, N.; Kurosawa, K.; Suzuki, A.; Abe, E.; Sasaki, K. (Japan Inst. Rural Med., Usuda, Nagano, Japan) **[Oral administration of chlorpyrifos to mammals.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 626-627; 1978. (Japanese)

Toxicity testing of chlorpyrifos was performed using rats and monkeys. Rats were given a single oral dose of 5, 10, 20, 100, 200 or 300 mg/kg chlorpyrifos and then sacrificed at 2, 5, 10, 20, or 40 days later. No histopathological changes were noted in the lower dose-treated animals until day 20 when a residue of 0.66 ppm was observed in adipose tissues. Rats treated with 100, 200 or 300 mg/kg had higher mortality rates, and large residues were observed after day 20. Monkeys were given a 5 or 10 mg/kg dose of chlorpyrifos every 10 days for 80 days. After an initial irregularity noted the first 2 days in the higher dosed monkey, EEG's were normal. Blood cholinesterase activities were the most reduced after initial administration of chlorpyrifos. Although the cholinesterase activities increased slightly, they never completely returned to normal during the treatment period. Anorexia was noted in the monkeys on day 1. [At the 27th annual meeting of the Japanese Society for Rural Medicine.]

79-0699. Hoshijima, K.; Narita, S.; Sato, J.; Honjuku, H. (Sch. Hyg., Fac. Med., Fukushima Univ., Fukushima, Japan) **[Effects of pesticides on the behavior of mice.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 628-629; 1978. (Japanese)

Vamidothion, Salithion, diazinon, fenitrothion and cyanophos were orally administered to groups of CFW mice at levels of 0.1-0.033 LD50. After 50-55 days motility, treadmill time and serum enzyme activities were examined. In groups given cyanophos, the motility testing showed an initial accentuation and then a decrease as the level of pesticides was increased. Vamidothion also caused an increase followed by a decrease in motlity. Fenitrothion and Salithion caused an accentuation only and no change in motility was seen in the diazinon group. Cholinesterase activity was inhibited in relation to the change in motility. The treadmill tests showed a significant reduction as compared to the control. The degree of reduction was not directly related to the dose level or to abnormal enzyme levels. Administration of pesticides continuously for 24-31 days caused an abnormal change in motility and a reduction of durability under forced exercise. The conclusion is that behavioral testing is a useful tool in evaluating organophosphate pesticide poisoning. [At the 27th annual meeting of the Japanese Society for Rural Medicine.]

79-0700. Kudo, Y.; Nakamura, I.; Nishida, N. (Sch. Hyg., St. Marianna Med. Coll., Kawasaki, Kanagawa, Japan) **[Change of erythrocytic cells in the peripheral blood of rabbits due to the load of pesticide.]** *Nippon Noson Igakkai Zasshi (Jpn. J. Rural Med.)* 27(3): 630-631; 1978. (Japanese)

Six groups of rabbits were given subcutaneous injections of 0.5 ml/kg olive oil suspensions of butachlor (15.7 mg in 1 ml), thiophanate-methyl (150.0 mg in 1 ml), chlorobenzilate 8.6 mg in 1 ml), fenitrothion 7.9 mg in 1 ml, fenitrothion and *m*-tolyl methyl carbamate (MTMC) (7.9 mg + 2.7 mg in 2 ml) for 16 days. Body weights, reticulocyte and punctate basophil erythrocyte counts, and changes in the erythrocyte membrane were examined daily. A slight loss in body weight was seen initially. After 1 wk, slight body weight gains were noted along with an increased healthy appearance. An increase in reticulocytes and the appearance of punctate basophil erythrocytes occurred in all test animals. Immature erythrocytes were seen for a long period (93-142 days) after the

last administration of the pesticide. The dynamic change of the erythrocyte membrane was remarkable at the hemolytic point (related to the lower osmotic pressure side). The change took a long period to recover. [At the 27th annual meeting of the Japanese Society for Rural Medicine.]

79-0701. Yanagisawa, F.; Ueda, Y.; Tsuchida, M. (Dept. Epidemiol., Inst. Incurable Dis., Tokyo Dent. & Med. Coll., Tokyo, Japan) **[Acute intoxication by *O*-phenylphenol.]** *Nippon Noson Igakki Zasshi (Jpn. J. Rural Med.)* 27(3): 632-633; 1978. (Japanese)

Toxicities of *o*-phenylphenol (OPP), the sodium salt of *o*-phenylphenol (Na-OPP) and OPP in combination with lauryl sulfate, a surfactant, were studied. Lauryl sulfate (85 mg/kg, po) was not lethal when administered alone. Administration of OPP (2 g/kg, po) was lethal to 5 of 10 mice tested. A combination of OPP and lauryl sulfate, 2.0 g/kg and 85 mg/kg, respectively, resulted in the deaths of 9 of 10 mice. However, when combined as 1.6 g/kg OPP and 17 mg/kg lauryl sulfate, only 1 death occurred. When subcutaneously injected with OPP, OPP + lauryl sulfte, or with Na-OPP and examined 24 hr later, no Na-OPP remained, the OPP + lauryl sulfate were present in a lesser amount and almost all of the OPP remained. In mice given 0.2% or 0.05% Na-OPP for 18 wk, marked reductions in body weight gain were noted. [At the 27th annual meeting of the Japanese Society for Rural Medicine.]

79-0702. Valcamonica, C. (Ist. Biol. Gen., Fac. Med., Univ. Roma, Rome, Italy) **Utilizzazione dell'*N,N*-di*sec* butil-*S*- benziltiocarbamato da parte di microorganismi del suolo. [Utilization of *N,N*-di*sec* butyl-*S*- dibenzylthiocarbamate by soil bacteria.]** *Nouvi Ann. Ig. Microbiol.* 28(1): 55-64; 1978. (19 references) (Italian)

Microbial strains capable of utilizing Drepamon (M 3432, *N,N*-di-*sec*- butyl-*S*-benzyl thiocarbamate) as the sole source of carbon were studied with special consideration of their adaptation to increasing herbicide concentrations. Even though concentration has to remain high enough for a prolonged period of time to be effective (in controlling *Echinochloa* in rice fields), decomposition must proceed fast enough to prevent herbicide accumulation in the environment. Microbial strains of *Pseudomonas* and *Corynebacterium* were isolated from waters of the Tiber River in Rome capable of utilizing Drepamon in concentrated solutions (1%) as the sole source of carbon. Drepamon manifests low toxicity towards soil and water microflora. Oxygen consumption data indicate that, in the presence of Drepamon as the only source of carbon, the bacteria require a longer adaptation period than in a yeast extract medium, but oxygen consumption is comparable.

79-0703. Kato, N.; Kato, M.; Kimura, T.; Yoshida, A.* (Dep. Agric. Chem., Nagoya Univ., Nagoya, Japan) **Effect of dietary addition of PCB, DDT or BHT and dietary protein on vitamin A and cholesterol metabolism.** *Nutr. Rep. Int.* 18(4): 437-445; 1978. (31 references)

Male Wistar rats were maintained on test diets to which varying amounts of vitamin A, BHT, DDT and PCB were added. In rats receiving a PCB-containing, high-protein diet without supplemental vitamin A, a clear growth depression was noted. These rats also demonstrated symptoms of xerophthalmia, which were not evident in rats on the PCB-containing, high protein diet plus vitamin A. In rats receiving the high protein diet along with 0.05% DDT, 0.2% BHT, or 0.2% PCB a significant decrease was noted in the liver level of vitamin A. These chemicals also increased plasma levels of cholesterol, and the amount of total liver lipids.

79-0704. Herin, R. A.; Suggs, J. E.; Lores, E. M.; Heiderscheit, L. T.; Farmer, J. D.; Prather, D. (Dep. Physiol. & Biophys., Colorado State Univ., Fort Collins, CO 80523) **Correlation of salt gland function with levels of chlorpyrifos in the feed of mallard ducklings.** *Pestic. Biochem. Physiol.* 9(2): 157-164; 1978. (15 references)

Studies were performed to determine the suitability of the salt gland of the mallard duck as a useful model for testing exposure to organophosphorous pesticides. Forty-eight ducklings were placed on a salt-water diet and 48 on a fresh-water diet. Treatment included 75, 150, or 300 ppm chlorpyrifos for both groups. At the end of 2 wk, ducks were given an ip challenge dose of 25 ml/kg of 5% NaCl: 0.5% KCl mixture. Salt gland effluents were collected for 3 hr. Brains and salt glands were then assayed for cholinesterase activity. The 300 ppm treatment produced 100% mortality. There was an inverse correlation between the level of chlorpyrifos and salt gland function, and brain and salt gland cholinesterase activities. The authors conclude that the salt gland is a useful model for testing pesticide exposure.

79-0705. Walker, C. H.; Jefferies, D. J. (Dep. Physiol. & Biochem., Univ. Reading, Reading, Berks, England) **The postmortem reductive dechlorination of *p,p'*-DDT in avian tissues.** *Pestic. Biochem. Physiol.* 9(2): 203-210; 1978. (22 references)

Studies were performed on pigeons, Bengalese finches, and Japanese quail to determine the rates and sites of postmortem dechlorination of *p,p'*-DDT. Mature birds were maintained on normal diets prior to treatment with an oral dose of DDT (0.2 ml of a 60 mg/ml solution in wheat germ and cod liver oil) every 2 days for 14 days. Liver samples from all the species were analyzed by gas chromatography immediately after death, then stored at various temperatures and analyzed periodically for up to 6 wk. Reductive dechlorination of DDT to DDD occurred rapidly at 20°C (90% after 8 hr); however, at -10°C and -20°C, the process was much slower. Dechlorination is believed to be an anaerobic intracellular process, not mediated by bacteria. The discovery of postmortem dechlorination leads to questions about the interpretation of DDT residues. The authors recommend that pesticide extractions be made immediately after death.

79-0706. Khasawinah, A. M. A.; March, R. B.; Fukuto, T. R. (Union Carbide Corp., South Charleston, WV 25303) **Insecticidal properties, antiesterase activities, and metabolism of methamidophos.** *Pestic. Biochem. Physiol.* 9(2): 211-221; 1978. (36 references)

Studies were performed in which several species of insects and mice were given various doses of methamidophos and analyzed for insecticidal properties, antiesterase activities, and metabolism of the pesticide. The twenty-four hr LD50 value ranged from 1.2 to 12.8 μg/g for houseflies and was 0.21 μg/g for honeybee workers. Cholinesterase activity inhibition studies demonstrated that methamidophos is only a moderate inhibitor with I50 values ranging from 11 μ*M* for housefly head to 8.2 μ*M* for white mouse brain. Methamidiphos was slow in producing acute symptoms of poisoning. Its relative stability and low *in vivo* degradation were critical in accumulating a sufficient interval concentration for a period of time necessary to permit toxicity.

79-0707. Shah, P. V.; Guthrie, F. E. (Dep. Entomol., North Carolina State Univ., Raleigh, NC) **Dermal absorption, distribution, and the fate of six pesticides in the rabbit.** In: *Pesticide Management and Insecticide Resistance.* Watson, D. L., and Brown, A. W. A., eds. (New York: Academic Press): pp. 547-554; 1976. (10 references)

New Zealand white female rabbits were exposed by topical application to dieldrin, DDT, malathion, parathion, aminotriazole (amitrole) or carbaryl. Pesticides were applied to a shaved area in the neck region of the body. The chemicals were in 0.1 ml acetone containing about 1 mg of nonradioactive pesticide/kg body weight and about 20 μCi labeled material. After 1 min, more carbaryl was found in the blood than other compounds except parathion, which was similar. Dieldrin was more slowly absorbed than the others. At 5 min carbaryl appeared to penetrate faster. Malathion and DDT penetrated slower, but still faster than did dieldrin. After 15 min the order of penetration into blood from most to least was aminotriazole, carbaryl, malathion, DDT, and dieldrin with parathion being equal to carbaryl. Carbaryl and malathion were found mostly in urine and feces. Parathion showed a similar distribution with appreciable quantities also found in the kidney, lungs, liver and fat. DDT and dieldrin were found in appreciable quantities in fat. Aminotriazole followed storage and distribution patterns similar to other chlorinated hydrocarbons except that fat was used as an inconsequential site of storage.

79-0708. End, D. H.; Carchman, R. A.; Dewey, W. L. (Med. Coll. Virginia, Richmond, VA 23298) **Assessment of the neurotoxicity of Kepone *in vitro*.** *Pharmacologist* 20(3): 188; 1978.

The effects of Kepone (chlordecone) on central neuronal function *in vitro* on rat brain specimens were evaluated. Kepone inhibited the depolarization evoked release of dopamine when used at concentrations of 10 μ*M* while concentrations of 1 μ*M* to 10 μ*M* produced an amphetamine-like stimulation of serotonin release. Tremorigenic doses of Kepone at 40 mg/kg orally given at 18 hr prior to sacrifice produced no effects on the above parameters, but did cause a 50% inhibition of succinate-stimulated mitochondrial uptake of ^{45}Ca. It is suggested that Kepone's neurotoxicity is the also a cause of disruption of mitochondrial respiration and/or transport functions. [At the 1978 joint meeting of the American Society for Pharmacology and Experimental Therapeutics and the Society of Toxicology.]

79-0709. Uziak, S.; Leoniak-Steinbrich, K. (Dep. Soil Sci., Maria Curie-Sklodowska Univ., PL-20-033 Lublin, Poland) **Enzymatic activity of soils treated with herbicides.** *Pol. J. Soil Sci.* 9(2): 123-129; 1976. (15 references)

Linuron was applied to potato fields for killing weeds on both loess and sandy soils at doses of 3 and 30 mg/kg/ha. In fields of barley on sandy soil, 2,4-D + dicamba was used at doses of 3 and 30 mg/ha. PCA (pyrazon) was used on loess soil during growth of vegetables at 4 and 40 kg/ha. Soil samples were analyzed at 0, 3, 10, 30, 60, 120, and 180 days after herbicide application. Saccharase activity in both soils showed considerable fluctuation during the vegetation periods and was much higher in the accumulation horizon than in the subhumus layers, particularly in sandy soil. Factors which had some importance to the change in enzymatic activity included the relation of the herbicide activity to the soil and its layer, the vegetation period of the plants, and the plant cover. However, the changes in enzyme activity which were noted were neither great nor stable.

79-0710. Merchan, J.; Diaz-Gil, J.; Trigueras, M. A.; Navarro, M. A.; Viladiu, P.; Gosalvez, M. (Dep. Histol. & Anat. Patol., Fac. Med., Univ. Complutense, Madrid, Spain) **Morphological study of rotenone-induced breast tumors in wistar rats.** *Rev. Esp. Oncol.* 25(1): 107-120; 1978. (24 references)

Tumors were induced in Wistar rats by the use of rotenone. A total of 20 primary tumors and a total of 10 transplanted tumors were studied morphologically. Rotenone was administered for 2-3 mo at doses of 0.1 to 0.2 mg/rat/day, 5 days/wk. The first 20 injections were of 0.1 mg and the rest of 0.2 mg until the indicated total dose was attained. Early mammary tumors appeared 6 mo after the end of treatment and the number of tumors increased up to 24 mo. The mean incidence of tumors at 18 mo was about 35% from the ip administration. The tumors appeared as sc masses of not more than 5 cm of maximum lenth, always located in the breast and perfectly isolated from neighboring tissues by means of a firm capsule of white color and a fasciculated appearance. It was concluded from this study that these tumors can be diagnosed as formed by the coexistence of areas of mammary fibroadenoma and areas of fibrocystic disease with the latter resembling in some ways its human counterpart.

79-0711. Ou, L. T.; Davidson, J. M.; Rothwell, D. F. (Soil Sci. Dep., Univ. Florida, Gainesville, FL 32611) **Response**

of soil microflora to high 2,4-D applications. *Soil Biol. Biochem.* 10(5): 443-445; 1978. (10 references)

High rates of application of 2,4-D were made to sandy loam soil and it was noted that very little degradation occurred when this rate was 5000 μg/g soil or higher. Bacterial populations in this soil were significantly lower than in untreated soils used as controls. When the 2,4-D concentration was increased to 5000 or 20,000 μg/g, the bacterial populations declined sharply after only 3 hr incubation. Fungal populations were stimulated at rates of 500 μg/g. Actinomycete populations in the 500 μg/g treated soil were significantly reduced. Among the three groups of microorganisms considered, bacteria were the least sensitive to high 2,4-D at high concentrations and actinomycetes were the most sensitive for this particular soil. However, the soils that degrade 2,4-D at high concentrations, the response of the soil microflora to high 2,4-D concentrations may be different. It is suggested that the disposal of 2,4-D in a soil that did not degrade the pesticide easily would result in undesirable effects on the microbial populations, and that soil microbial processes would also decline.

79-0712. Bulger, W. H.; Muccitelli, R. M.; Kupfer, D. (Worcester Fnd. Exp. Biol., Shrewsbury, MA 01545) **Interactions of chlorinated hydrocarbon pesticides with the 8*s* estrogen-binding protein in rat testes.** *Steroids* 32(2): 165-176; 1978. (37 references)

Sucrose sedimentation analysis was used to study the effect of various DDT analogs on the binding of ^{3}H-labeled estradiol to the 8-9*S* estrogen binding protein of rat testicular cytosol. Inhibition of the binding activity was caused by *o,p'* -DDT, but not by *p,p'*-DDE. It is noted that the former compound is estrogenic in the intact female while the latter is a non-estrogen in the female. Methoxychlor did not inhibit binding, but it is estrogenic *in vivo* in the female. It is suggested that metabolic activation is required for binding to the testicular cytosol. It is concluded that DDT analogs appear to have the potential to exhibit anti-androgen-like and estrogen-like effects in the male rat.

79-0713. Giri, S. N.; Siegel. D. M.; Peoples, S. A. (Dep. Physiol. Sci., Sch. Vet. Med., Univ. California, Davis, CA 95616) **Tissue distribution and binding of radioactivity in mouse after intravenous administration of [^{14}C] 3-chloro-*p* -toluidine.** *Toxicology* 11(1978): 153-165; 1978. (16 references)

The pharmacokinetic and pharmacodynamic aspects of the avicide CPT hydrochloride (3-chloro-*p*-toluidine) in mice were studied. Male Swiss Webster mice were injected with 3 μCi of [^{14}C] CPT (5.9 mg/kg) through the tail vein. Liver, kidney, heart, testicle, spleen, skeletal muscle, lung, epididymal fat, and brain were dissected after blood collection, and tested for radioactivity. For determination of subcellular distribution of [^{14}C] CPT in liver and kidney, mice were sacrificed at 6 hr after injection. Binding of radioactive CPT to tissue protein was assayed in mice sacrificed 12, 18, 24, and 36 hr after administration. The radioactivity associated with [^{14}C] CPT appeared to leave the plasma and many of the tissues with two elimination rate constants, a fast and a slow component. The faster component of the plasma appeared to be similar to the faster component in the decay curve of fat, brain, lung, heart, intestine, and kidney. The maximal covalent binding occurred at 18 hr to kidney protein, and at 12-18 hr to liver and lung protein. The percent distribution of radioactivity in subcellular liver and kidney fractions correlated with the amount of protein associated with the subcellular fraction. The 102,000 *g* fraction of the liver contained the highest percentage of radioactivity.

79-0714. Verma, S. R.; Gupta, A. K.; Bansal, S. K.; Dalela, R. C. (Poll. Relevant Res. Lab., Dep. Zool. D.A.V. (P.G.) Coll., Muzaffarnagar, India) ***In vitro* disruption of ATP dependent active transport following treatment with aldrin and its epoxy analog dieldrin in a fresh water teleost, *Labeo rohita*.** *Toxicology* 11(2): 193-201; 1978. (19 references)

The disruption of ATP dependent active transport system by the pesticides aldrin and dieldrin was studied. Homogenized brain, gill, liver, and kidney tissues of the fresh water teleost *Labeo rohita* were subjected to *in vitro* concentrations of 5.0, 1.66, 0.55, 0.18, and 0.06 μM of aldrin and dieldrin. Both pesticides inhibited total ATPase and Mg^{+2}, Na^{+}, and K^{+}-dependent ATPase activities in a concentration related manner, 5.0 M concentrations of aldrin inhibited 54.7% of all ATPase in the brain; 51.9% in the gill, 43.3% in the liver, and 45.6% in the kidney. 5.0 μM dieldrin treatment were followed by a 65.5% ATPase inhibition in the brain, 53.4% in the gill, 46.6% in the liver and 52% in the kidney ATPase. Maximum ATPase inhibition for all test concentrations always occurred in the brain, followed by the gill, kidney, and liver. Inhibition was always higher for dieldrin than for aldrin.

79-0715. Hulth, L.; Hoeglund, L.; Bergman, A.; Moeller, L. (Inst. Zoophysiol., Univ. Uppsala, S-75122 Uppsala, Sweden) **Convulsive properties of lindane, lindane metabolites, and the lindane isomer α-hexachlorocyclohexane: effects on the convulsive threshold for pentylenetetrazol and the brain** content of γ-aminobutyric acid (GABA) in the mouse. *Toxicol. Appl. Pharmacol.* 46(1): 101-108; 1978. (13 references)

The threshold for pentylene tetrazol-induced convulsions in the mouse is affected by lindane in two opposite ways. Following the administration of a single dose of lindane, the threshold first decreases and then, after 2 days, increases above the normal level. None of the tested metabolites of lindane altered the convulsive threshold. When lindane elevates the convulsive threshold it also elevates the content of γ-aminobutyric acid (GABA) in the brain. The lindane isomer α-hexachlorocyclohexane (α-BHC) elevates both convulsive threshold and the GABA content. The smallest single oral dose of lindane lowering the convulsive threshold for pentylene tetrazol in the mouse, 3 hr after administration, corresponds to a lindane concentration of 56 ppb in whole blood. (Author abstract by permission)

79-0716. Kimbrough, R. D. (CDC, Public Health Serv., US Dep. Health, Educ. & Welfare, Atlanta, GA 30333) **The effect of technical and purified pentachlorophenol on the rat liver.** *Toxicol. Appl. Pharmacol.* 46(1): 151-162; 1978. (18 references)

Dietary concentrations of 0, 20, 100, and 500 ppm of technical grade pentachlorophenol (PCP) were fed to male and female Sherman strain rats for 8 mo. The same experiment using purified pentachlorophenol was carried out. The food consumption was measured in all rats during the second wk of exposure and for one wk every 6 wk thereafter. An autopsy was performed on all rats at the end of the experiment. The brain, lungs, spleen, liver, kidneys, heart, and testes were weighted and examined grossly and microscopically in all rats fed purified pentachlorophenol, all female rats fed technical pentachlorophenol, and in the male rats fed the highest dose of technical pentachlorophenol and the controls. Only the kidneys and livers were examined microscopically in the male rats fed 20 and 100 ppm of technical pentachlorophenol. Although the food intake was comparable, male and female rats fed 500 ppm of technical and male rats fed 500 ppm of purified pentachlorophenol gained less weight. The livers of the male and female rats fed 500 ppm technical pentachlorophenol weighed significantly more than those of the controls. The kidneys of all male rats fed purified pentachlorophenol weighed significantly more than those of the controls; however, there was no dose-related increase. No morphological changes were seen in the kidneys. At the 500-ppm dietary concentrations, technical pentachlorophenol produced a severe effect in the liver of female rats characterized by vacuolation of the hepatocytes, an increase in fibroblasts and other mononuclear cells within sinusoids, bile duct proliferation, periportal fibrosis, degenerated liver cells, increased mitotic figures, and an accumulation of brown pigment in macrophages and in Kupffer cells. In male rats at the 100- or 500-ppm dietary concentrations of technical pentachlorophenol, the predominant lesion consisted of enlarged pleomorphic hepatocytes which had foamy cytoplasm or cytoplasm with large vacuoles. The walls of the hepatic central veins of the livers in animals of both sexes were thickened. At the 100-ppm dietary concentrations similar but less pronounced effects were observed in the livers. Only mild alterations were noted at the 20-ppm dietary concentration. Purified pentachlorophenol caused slightly enlarged liver cells with occasional eosinophilic cytoplasmic inclusions at 500 ppm but no alterations were observed in the livers of rats fed the 100- and 20-ppm dietary concentrations. The results suggest that most of the toxicity associated with feeding technical grade pentachlorophenol to rats at these dietary concentrations stems from toxic contaminants rather than from pentachlorophenol. (Author abstract by permission)

79-0717. Short, R. D.; Minor, J. L.; Winston, J. M.; Seifter, J.; Lee, C. C. (Dep. Pharmacol. & Toxicol., Midwest Res. Inst., Kansas City, MS 64110) **Inhalation of ethylene dibromide during gestation by rats and mice.** *Toxicol. Appl. Pharmacol* 46(1): 173-182; 1978. (15 references)

Pregnant rats and mice inhaled ethylene dibromide (EDB) at concentrations of 20, 38, and 80 ppm for 23 hr a day. The exposures started on day 6 of gestation and lasted for a total of 10 days. Observations were made on maternal welfare and fetal development. The results of this study indicated that: EDB was more toxic to pregnant mice than pregnant rats; adverse effects on maternal welfare, as measured by weight gain, feed consumption, and survival, were observed in both mice and rats; and morphological changes were observed in fetuses from dams exposed to EDB. However, the latter occurred at concentrations that also affected maternal welfare. Consequently, EDB was judged to have little primary effect on development in this study. (Author abstract by permission)

79-0718. Abou-Donia, M. B.; Graham, D. G. (Dep. Pharmacol. & Pathol., Duke Univ. Med. Cent., Durham, NC 27710) **Delayed neurotoxicity from long-term-low-level topical administration of leptophos to the comb of hens.** *Toxicol. Appl. Pharmacol.* 46(1): 199-213; 1978. (39 references)

The production of delayed neurotoxicity in hens following percutaneous administration of leptophos [*O*-(4-bromo-2,5-dichlorophenyl) *O*-methyl phenylphosphonothioate] has been investigated. By applying a solution of the insecticide in acetone to the comb, seven groups of three laying hens were given daily a single percutaneous dose of 0.1, 0.5, 1.0, 2.5, 5.0, 10.0, or 20.0 mg/kg of leptophos for 183-323 days. All hens given 0.5-20 mg/kg developed ataxia. The group of hens given a daily dose of 0.1 mg/kg of leptophos showed no abnormalities in gait or behavior. The severity of the clinical condition depended on the size of the daily applied dose. The "latent period" and "total administered dose" before onset of ataxia depended on te daily topically applied dose. The most consistent histopathological changes were degeneration of myelin and axons in spinal cords of intoxicated birds. The severity of change was greatest in hens receiving the highest doses. While plasma cholinesterase was inhibited in all treated birds, plasma acid phosphatase activity was significantly increased. The present investigation shows that long-term low-dose application of leptophos to the comb produced delayed neurotoxicity in hens similar to that reported for the oral administration of this compound. (Author abstract by permission)

79-0719. Yoshida, T.; Jordan, L.; Neal, R. A. (Dep. Biochem., Cent. Environ. Toxicol., Vanderbilt Univ. Sch. Med., Nashville, TN 37232) **Effect of ethylenebis diisothiocyanato sulfide (EBIS) on hepatic monooxygenase activity.** *Toxicol.. Appl. Pharmacol* 46(1): 215-225; 1978. (33 references)

The effect of ethylene bis diisothiocyanato sulfide (EBIS), a breakdown product of the ethylenebis dithiocarbamate fungicides, on the hepatic cytochrome P450-containing monooxygenase system of rats and mice has been examined. *In vivo* administration of EBIS to rats and mice causes a dose-dependent decrease of hepatic cytochrome P450 and an inhibition of the cytochrome P450 monooxygenase-catalyzed metabolism of aniline and benzphetamine. Incubation of

EBIS with hepatic microsomes from rats and mice in both the presence and absence of NADPH also leads to a decrease in the level of cytochrome P-450 in these microsomes and a decrease in the monooxygenase activity toward aniline or benzphetamine. The *in vitro* but not the *in vivo* decrease in cytochrome P450 is accompanied by an increase in cytochrome P420, an inactive form of cytochrome P450. The decrease in cytochrome P450 and the inhibition of monooxygenase activity seen on incubation of EBIS with hepatic microsomes appears to be a result of the nonenzymatic reaction of EBIS with hepatic microsomes appears to be a result of the nonenzymatic reaction of EBIS with sulfhydryl groups of cysteine residues in cytochrome P450. The inhibition of hepatic monooxygenase activity and decrease in hepatic cytochrome P450 concentration seen on administration of EBIS *in vivo* appear to result from a mechanism other than reaction of EBIS with cysteine residues in hepatic cytochrome P450. (Author abstract by permission)

79-0720. Farr, J. A. (Fac. Biol., Univ. West Florida, Pensicola, FL 32504) **The effects of methyl parathion on predator choice of two estuarine prey species.** *Trans. Am. Fish. Soc.* 107(1): 87-91; 1978. (26 references)

A choice of prey was offered to the gulf killifish, *Fundulus grandis*. The choice included grass shrimp, *Palaemonetes pugio*, and juvenile sheepshead minnows, *Cyprinodon variegatus*. The prey species were exposed to methyl parathion for 24 hr before being offered to the predator. When the prey were exposed to methyl parathion, gulf killifish consumed a greater proportion of grass shrimp relative to sheepshead minnows. Higher capture coefficients indicated relatively greater predation on *P. pugio* than on *C. variegatus* as compared with controls. When various concentrations of methyl parathion were used it was noted that the ratio of grass shrimp to sheepshead minnows decreased with time at increasing concentrations. The study indicates that low concentrations of the organophosphate insecticide methyl parathion can alter the relative proportions of prey in a predator's diet. The change in food preference demonstrated is apparently mediated by a decrease in the ability of grass shrimp to avoid predation when exposed to sublethal concentrations of methyl parathion.

79-0721. Taranova, N. P. (Dep. Biochem., First Leningrad Med. Inst., Leningrad, USSR) **Vklyuchenie 2-^{14}C-atsetata v glikolipidy spinnogo i stvol golovnogo mozga morskikh svinok v norme i v paraliticheskoi stadii intoksikatsii triortokrezilfosfatom. [Incorporation of 2-^{14}C-acetate into glycolipids of guinea pig brain and spinal cord in normal and paralytical state, caused by tri-*o*-cresyl phosphate intoxication.]** *Vopr. Med. Khim.* 24(5): 636-640; 1978. (14 references) (Russian)

The effect of tri-*o*-cresyl phosphate (technical preparation with 37% *ortho*-isomers), administered intradermally in a single dose of 2-2.2 ml/kg, on the incorporation of 2-^{14}C-acetate in glycolipids of the brain stem and spinal cord of 32 guinea pigs was studied during the paralytic stage of poisoning (27-33 days after poisoning). The acetate was administered sc 2 hr before decapitation. The specific activity (in impulses/min/mg) in the spinal cord was 25 in the cerebrosides of the spinal cord, versus 26 in the controls; 1,557 in the gangliosides versus 1,588 in the controls; 400 in the homogenate versus 270 in the controls ($p < 0.02$), and 71 in the acid-soluble fraction versus 42 in the controls ($p < 0.02$). In the brain stem, the specific activity found in the cerebrosides was 13 versus 17 in the controls ($p < 0.05$); 1,075 versus 714 in the controls in the gangliosides ($p < 0.01$); 668 in the homogenate versus 423 in the controls ($p < 0.02$), and 80 in the acid-soluble fraction, versus 51 in the controls ($p < 0.05$). These findings suggest that tri-*o*-cresyl phosphate affects metabolic processes both in oligodendroglial cells and in neurons, where ganglioside biosynthesis occurs.

79-0722. Janke, D.; Fritsche, W. (Sekt. Biowissensch. Martin Luther Univ., Halle-Wittenberg, DDR) **Mikrobielle Dechlorierung von Pesticiden und anderen Umweltchemikalien. [Microbial dechlorination of pesticides and of other chemicals present in the environment.]** *Z. Allg. Mikrobiol.* 18(5): 365-382; 1978. (90 references) (German)

A review of the dechlorinating actions of microorganisms on pesticides as well as other environmental chemicals is presented. Microbial dechlorination of aliphatic compounds by such strains as *Pseudomonas dehalogenans, Arthrobacter* sp., and *Micrococcus denitrificans* is considered. Direct dechlorination of the aromatic ring by *Aspergillus niger, Brevibacterium, Arthrobacter,* and a *Nocardia* strain is discussed. Dechlorination of chloriated aromatic compounds following *ortho-* and *meta*-splitting of the aromatic ring by *Arthrobacter, Pseudomonas,* and *Archromobacter* strains, and dechlorination of polychlorinated compounds such as lindane by a *Clostridium* species and an *Escherichia coli* strain, DDT by *Aerobacter aerogenes,* and pentachlorophenol is described. A table of the most important known-to-date microbial dehalogenation reactions is compiled listing the compound, the product and the probable mechanism involved in the reaction. Included are pesticides whose effectiveness is predicated on chlorine susbtitution where, in a few cases, microbial decomposition is due to specific dehalogenases. However, the majority are decomposed by enzymatic reactions where hydroxylation plays a special role by forming unstable halogen-hydroxy compounds. All the studies were performed using pure cultures, thus no conclusions can be drawn on degradation taking place under natural conditions where factors of soil and water must be considered.

79-0723. Juhnke, I.; Luedemann, D. (Author address not given) **Ergebnisse der Untersuchung von 200 chemischen Verbindungen auf akute Fischtoxizitaet mit dem Goldorfentest. [Results of the investigation of the ichthyotoxicity of 200 chemical compounds by the Goldorfen test.]** *Z. Wasser Abwasser Forsch.* 11(5): 161-164; 1978. (3 references) (German)

Two hundred chemical compounds, including pesticides were studied for their ichthyotoxicity in the ide (*Leucis-*

cus idus melanotus) test at two laboratories. The LC50 and LC100 values were found to be 33 and 100 mg/l, respectively, for atrazine; 20 and 30 mg/l for carbaryl; 536-752 mg/l and 564-940 mg/l for cyclohexanone; 0.2 and 0.3 mg/l for *p,p'* -DDT; 2 and 3 mg/l for dinoseb; 0.8 and 1.2-1.4 mg/l for copper (II) chloride; 0.28-0.03 mg/l and 0.5-0.07 mg/l for lindane; 74 and 120 mg/l for monolinuron; 0.07-0.5 mg/l and 0.12-0.63 mg/l for sodium cyanide; 0.48 and 1.26 mg/l for ethyl parathion; 0.85 and 1.5 mg/l for ethyl parathion E 605 forte; 0.5 an 0.7-0.59 mg/l for mercury (II) chloride, and 7.6 and 8.7 mg/l for tri-*n*-butylphosphate.

79-0724. Buchalski, L.; Kacperczyk, J.; Sosinska, G. (Author address not given.) **Ocena jakosci nasienia buhajow w badaniu wstepnym i uzupelniajacym, ktorym naskornie stosowano pestycydy Neguvon i IPO-63. [Evaluation of the quality of bull semen in preliminary and expanded tests, after topical application of Neguvon and IPO-63 pesticides.]** *Zesz. Probl. Postepow Nauk Roln.* 196: 63-66; 1977. (4 references) (Polish)

The effect of topically applied Neguvon (trichloron) and IPO-63 [*O,O*-dimethyl-*O*- 1- (2,4-dichlorophenyl) -2-bromovinyl phosphate] on the quality of bull semen was studied in 42 3-8-yr-old bulls. The insecticides were applied in a total dose of 16 g/animal. The investigations were carried out twice a week for 21 days. The evaluation concerned the volume, consistency, odor, color, density, sperm motility, percentage of spermatozoa (motile and nonmotile), pH of semen, sperm viability at 46.5°C, the primary and secondary morphological transformations of spermatozoa, and the spermatozoa concentration in mm^3. All parameters tested were found to be normal; they showed no significant differences from the untreated controls. The findings indicate that Neguvon and IPO-63 have no adverse effect on bull semen quality when applied to control bovine gadfly and other external pests in the test dose used.

See also 79-0535, 79-0541, 79-0581, 79-0730 *and* 79-0734.

79-0725. Hunt, D. F.; Sethi, S. K. (Dep. Chem., Univ. Virginia, Charlottesville, VA 22901) **Analytical application of positive and negative ion chemical ionization mass spectrometry.** *Adv. Chem. Ser.* 70: 150-178; 1978. (32 references)

The techniques of chemical ionization mass spectrometry (CIMS) are examined. The methods of both CIMS and electron ionization (EI) are examined for positive ion identification. The uses and advantages of different reagents such as argon-water, deuterium oxide, ammonia, and nitric oxide, are discussed. The limitations of the positive ion CIMS and EI are listed. The method of negative ion chemical ionization mass spectrometry (NICIMS) is also described. The method is 100-1000 times more sensitive than positive ion methods. The various negative ion techniques, such as pulsed positive and negative ion chemical ionization (PPINICI), electron capture of both EI spectra and Bronsted Acid type spectra, and the Bronstead Acid-Bronstead Base spectra are described. The use of oxygen as the PPINICI reagent is examined. The analysis of nonvolatile compounds by the techniques of field desorption, the newer plasma desorption mass spectrometry, and the pulsed laser high energy technique are listed. Methods for increasing the accuracy of mass measurements are also described.

79-0726. Irwin, W. J.; Slack, J. A. (Dep. Pharm., Univ. Aston, Birmingham B4 7ET, England) **Analytical pyrolysis in biomedical studies. A review.** *Analyst (London)* 103(1228): 673-704; 1978. (344 references)

A detailed literature review of analytical pyrolysis in biomedical studies is presented. Methods of pyrolysis and subsequent detection processes including gas chromatographic and mass spectrophotometric techniques are presented and their uses in both qualitative and quantitative analyses are discussed. Applications of these techniques are presented in the areas of drugs, biomolecules, taxonomy, pathology, and the study of geological materials of biological origin. A case of degradation of DDT in tobacco smoke, investigated by pyrolysis in a nitrogen atmosphere followed by gas-liquid chromatography of the breakdown products is reviewed. Action mechanisms of reactions are discussed to provide analysts with the capabilities to develop further pyrolysis techniques. Computer programs for data handling are also considered.

79-0727. Smyth, M. R.; Osteryoung, J. G. (Dep. Microbiol., Colorado State Univ., Fort Collins, CO 80523) **Polarographic determination of some azomethine-containing pesticides.** *Anal. Chem.* 50(12): 1632-1637; 1978. (23 references)

The polarographic behavior of the insecticides Cytrolane (mephosfolan), Cyolane (phospholan), and chlordimeform, and of the fungicide drazoxolone has been investigated over the pH range 0-14. The best defined waves for the differential pulse polarographic determination of these compounds were obtained in Britton-Robinson buffers of pH 6, 6, 8, and 8, respectively. This technique has been applied to the determination of drazoxoline in a grain formulation. (Author abstract by permission of the American Chemical Society)

79-0728. Farnelli, R.; Chiabrando, C.; Airoldi, L. (Ist. Ric. Farmacol., I-20157 Milan, Italy) **Determination of volatile *N*-nitrosamines as pesticide contaminants by gas chromatography - mass fragmentography.** *Anal. Lett. A* 11(10): 845-854; 1978. (10 references)

A rapid and sensative method has been developed for the quantitative determination of *N*-dimethyl nitrosamine, *N*-diethyl nitrosamine, *N*-dipropyl nitrosamine, *N*-diisopropyl nitrosamine, and *N*-dibutyl nitrosamine in pesticides. This method was tested on ametryne, atrazine, linuron, prometryne, propazine, and trifluralin. Quantitation was achieved by gas chromatography mass spectrometry operating in the EI mode with selected ion monitoring for the nitrosamines. *N*-Dipropyl nitrosamine was found at levels of 34 ppm in trifluralin. No nitrosamines were detected in any of the other pesticides studied.

79-0729. El Sarnagawy, D.; Rizk, A. S. (Egypt. Acad. Sci. Res., Cairo, Egypt) **Estimation of organophosphorus pesticide malathion in fish tissue.** *Arch. Lebensmittelhyg.* 29(3): 104-106; 1978. (21 references)

Estimates were made of malathion residues in cooked fish tissue after the pesticide was administered intra-abdominally. Maximum absorbance was detected spectrophotometrically in the UV range for raw samples of fish studied. Roasting, frying, or boiling the fish caused decreases in the amount of malathion residue detected, with the amount decreasing in corresponding order to the cooking methods listed above. Boiling fish in ordinary water allowed the malathion to dissolve slightly and may account for the fact that the residue was lowest in fish prepared in this manner. However, residues were still detectable in fish prepared by each method.

79-0730. Morpurgo, G.; Aulicino, F.; Bignami, M.; Conti, L.; Velcich, A. (Univ. Roma, Rome, Italy) **Relationship between structure and mutagenicity of dichlorvos and other pesticides.** *Atti. Acad. Naz. Lincei Cl. Sci. Fish. Mat. Nat. Rend.* 62(5): 692-701; 1977. (26 references)

The mutagenicity of dichlorvos was studied by testing its mutagenicity with new test systems permitting detection of induced crossing-over. Studies were also conducted using triflorofon, triallate, diallate, sulfallate, azinphos methyl, fenchlorophos (ronnel), mevinphos, monocrotophos, methyl parathion, EPTC, and noruron. Only dichlorvos, trichlorfon, triallate, diallate, and sulfallate showed some genetic activity. Studies indicate that dichlorvos needs either cell division or a metabolically active cell in order to induce genetic damage. The mere presence of a phosphoric ester linkage is not sufficient to confer mutagenic and recombinogenic activity on a compound. It appears that a chlorvinyl or a chloro allyl group attached to any type of molecule may confer on the chemical a strong genetic activity if it can be spontaneously or metabolically split. It is thus reasonable to conclude that in all four of these compounds, the mutagenicity may be due to the chlorinated group.

79-0731. Sagredos, A. N.; Eckert, W. R. (NATEC, Gesellsch. Naturwiss. Tech., Hamburg, BRD) **Methoden zur Bestimmung von Phytopharmaka in Tabak und Tabakerzeungnissen. III. Mitteilung: Eine Schnelle Bestimmung von Fenamiphos und Fensulfothion. [Methods for determining pesticides in tobacco and tobacco products. Part III. Rapid method for determining fenamiphos and fensulfothion.]** *Beitr. Tabakforsch.* 9(2): 107-110; 1977. (3 references) (German)

A method for the rapid determination of phenamiphos and fensulfothion in tobacco and tobacco products is described. Following extraction with chloroform, chromatographic clean-up on alumina, and elution with chloroform, phenamiphos and fensulfothion are determined by gas-liquid chromatography, using phosphorus- and sulfur-specific flame photometric detectors, respectively. The limit of detection is 0.05 ppm for both substances. In a concentration of 0.5 ppm, the recovery rate was 95-99% for phenamiphos, and 88-104% for fensulfothion.

79-0732. Sagredos, A. N.; Moser, R. (NATEC, Gesellsch. Naturwiss. Tech., Hamburg, BRD) **Methoden zur Bestimmung von Phytopharmaka in Tabak und Tabakerzeugnissen. IV. Ein Bestimmungsverfahren fuer Vamidothion und seine Metaboliten. [Methods for determining pesticides in tobacco and tobacco products. Part IV: A method for determining vamidothion and its metabolites.]** *Beitr. Tabakforsch.* 9(2): 111-115; 1977. (7 references) (German)

A method for the determination of vamidothion and its metabolites (vamidothion sulfoxide and vamidothion sulfone) in tobacco and tobacco products is described. Following extraction with a mixture of water, acetone, and acetic acid, reextraction with chloroform, and clean-up on alumina column, the substances are determined by gas-liquid chromatography with sulfur-specific flame photometric detectors. The detector limit is 0.1 ppm for all three substances. In a concentration of 0.5 ppm, the recovery rate is 92% for vamidothion, 70% for vamidothion sulfoxide, and 91% for vamidothion sulfone.

79-0733. Reif, H.; Moser, F. (Austria Tabakwerke AG, Vienna, Austria) **Eine Methode zur Bestimmung der Rueckstaende von Organochlor- und Organophosphor-Pestiziden auf Tabak. [A method for the determination of organochlorine and organophosphorus pesticide residues on tobacco.]** *Beitr. Tabakforsch.* 9(3): 168-175; 1977. (5 references) (German)

A method for the extraction and gas-chromatographic determination of organochlorine and organophosphorus pesticide residues on tobacco is described. Extraction and clean-up are combined in one step; the powdered tobacco is mixed with Florisil, using a Florisil bottom layer, and dichloromethane for extraction. The solution from the combined extraction clean-up step can be used directly in the GC analysis. A column filled with 1.5% SP-2250 and 1.95% SP-2401 on Supelcon AW-DMCS (100/120), an injector temperature of 250°C, and a Ni-63 electron capture detector (350 °C) are used for the determination of organochlorine pesticide residues. Organophosphorus pesticide residues are determined on a column filled with 3% DC-200 on GasChrom (100/120), using a flame-photometric detector.

79-0734. Ramakrishna, N.; Ramachandrin, B. V. (Indian Drug Res. Lab., Poona 411005, India) **Malathion A and B esterases of mouse liver. III.** ***In vivo*** **effect of parathion and related PNP-containing insecticides on esterase inhibition and potentiation of malathion toxicity.** *Biochem. Pharmacol.* 27(16): 2049-2054; 1978. (32 references)

The reported failure of parathion to potentiate the toxicity of malathion and the high degree of potentiation effected by the closely related EPN have been re-investigated using certain new techniques. Parathion, EPN, paraoxon, fenitrothion and methyl parathion were injected into to mice in sub-multiples and multiples of their LD50s, in the latter case after protecting the animals with atropine and toxogonin. After an interval of 18 hr the malathion B esterase and the phenyl acetate esterase activities of the liver and the acetylcholinesterase activity of the brain were determined and the extent of inhibition calculated. In batches of mice similarly treated with the synergists, the LD50 of malathion was determined to assess the degree of potentiation. Contrary to available knowledge parathion is found to be a found to be a powerful potentiator of malathion, almost equal in potency to EPN. Fenitrothion, which is an insecticide of low mammalian toxicity, is also a strong potentiator at sub-lethal doses. An attempt is made to correlate the extent of inhibition of the esterases with the degree of potentiation of malathion toxicity. (Author abstract by permission)

79-0735. Suzuki, M.; Yamato, Y.; Koga, M. (Kitakyushu Munic. Inst. Environ. Health Sci., Kitakyushu 804, Japan) **Field desorption mass spectrometric analysis of organic compound residues in the environment. I. Organochlorine insecticides.** *Biomed. Mass Spectrom.* 5(9): 518-523; 1978. (16 references)

The identification of organochlorine insecticides and related compounds was made by field desorption mass spectrometry techniques. Standard field desorption mass spectra of these compounds are presented. Chemicals discussed include α-BHC, β-BHC, γ-BHC and δ-BHC, aldrin, dieldrin, endrin, heptachlor epoxide, *p,p'*-DDE, *p,p'*-DDT, *p,p'*-TDE, and *o,p'*-DDT. Soil taken from a lettuce field was shown to contain, by gas chromatography analysis, 0.011, 0.058, 0.008, 0.005, 0.019, 0.745, 0.014, 0.527, 0.372 and 2.790 ppm of α-, β-, γ-, δ-BHC, aldrin, dieldrin, heptachlor epoxide, *p,p'*-DDE, *p,p'*-TDE, and *p,p'*-DDT, respectively. Additional contamination was found in a soil sample collected from a spinach field, demonstrating that field soils have been polluted with mixtures of organochlorine insecticides and their related compounds. This was attributed to the fact that Japanese agricultural fields have two crops per year.

79-0736. Fraczek, S. (Dep. Food Sci., Inst. Environ. Res. & Bioanal., Acad. Med., PL-90145 Lodz, Poland) **Metoda**

oznaczania dinokapu w moczu. [Method for determination of dinocap in urine.] *Bromatol. Chem. Toksykol.* 11(1): 93-95; 1978. (7 references) (Polish)

A colorimetric method for the determination of dinocap in urine is described. Following extraction with ethyl ether, clean-up, and reextraction with *n*-hexane, dinocap is determined spectrophotometrically at 444 nm. In the concentration range of 10-100 $\mu g/100\ cm^3$, the recovery rate is 92.5-95%. The method is suitable for routine laboratory use.

79-0737. Underwood, J. C. (Total Diet Lab., US FDA, Kansas City, MO 64106) **Charcoal column separation of chlordane and toxaphene.** *Bull. Environ. Contam. Toxicol.* 20(4): 445-446; 1978. (2 references)

A standard mixture of chlordane and toxaphene was prepared containing 10 $\mu g/ml$ chlordane and 50 $\mu g/ml$ toxaphene. A chromaflex column was prepared for the analysis. The petroleum ether or hexane containing the chlordane-toxaphene to be separated was then transferred to the column and allowed to enter. It is noted that the solvent containing the chlordane and toxaphene to be separated must be free from product extract which could cause overloading of the micro-charcoal column and thus change the elution pattern. The separation thus achieved is suitable for quantitative purposes, and has proved of value on crops, fish, meats, oils and fats subjected to the analysis.

79-0738. Augustinsson, K. B.; Eriksson, H.; Fairjersson, Y. (Biochem. Inst., Arrhenius Lab., Univ. Stockholm, S-10691 Stockholm, Sweden) **A new approach to determining cholinesterase activities in samples of whole blood.** *Clin. Chim. Acta* 89(2): 239-252; 1978. (17 references)

An attempt was made to replace the laborious gasometric technique for determining cholinesterase activities in samples of whole blood, with a more convenient one suitable for routine work in clinical laboratories. The method described is based on the hydrolysis of propionyl thiocholine and the spectrophotometric determination of the thiocholine produced by the reaction with 4,4′- dithiodipyridine. The absorption maximum of 4-thiopyridone occurs at 324 nm, permitting its measurement in the presence of hemoglobin. As both plasma butyryl cholinesterase and erythrocyte acetylcholinesterase split propionyl thiocholine at about the same rate, a first determination given the total activity of which each individual activity is about 50%. A second determination made in the presence of a selective inhibitor for plasma butyryl cholinesterase gives the activity of the erythrocyte acetyl cholinesterase. The plasma enzyme is found by taking the difference between the two values.

79-0739. Etz, E. S.; Rosasco, G. J.; Blaha, J. J. (Inst. Mater. Res., Natl. Bur. Stand., Washington, DC 20234) **Observation of the Raman effect from small, single particles: its use in the chemical identification of airborne particulates.** *Environ. Sci. Res.* 13: 413-456; 1977. (102 references)

A report is presented on the use of a Raman microprobe for chemical analysis of airborne particulates. The principles of Raman spectroscopy using refected light from a laser are detailed. A series of experiments are then presented in which, among other compounds, the pesticide content of dust particles is determined. Four applications of the probe are demonstrated: The molecular microanalysis of individual particles in various environmental particulate samples; micromineralogical studies in which chain and sheet silicates are investigated as well as the identification of asbestos minerals; analysis of the power plant emissions; and finally, analysis of particulates for organic pollutants (including pesticides). Drawbacks of Raman spectroscopy are discussed, the primary weakness being the low light intensities of this process. Future uses of Raman spectroscopy are considered.

79-0740. Ershova, K. P.; Komarova, N. S.; Shitukhina, A. F. (A. N. Sysin Inst. Gen. & Communal Hyg., USSR Acad. Med. Sci., Moscow, USSR) **Opredelenie v vode DDVF spektrofotometricheskim metodom v infrakrasnoi oblasti spektra. [Infrared spectrophotometric determination of DDVP in water.]** *Gig. Sanit.* 43(8): 69-70; 1978. (3 references) (Russian)

IR spectroscopic determination on DDVP (dichlorvos) in water is described. DDVP is extracted from the water with carbon tetrachloride, saturated with NaCl, and the extract is transferred into a 1-cm cuvette to determine the optic density in the wavelength range of 1000-1200/cm. The relative error of the determination is ±5%, the sensitivity 1 mg/l. The sensitivity can be increased by using the same volume of carbon tetrachloride for extraction from a larger water sample, and a cuvette with a layer thickness greater than 1 cm.

79-0741. DeBeer, J.; Van Peteghem, C.; Heyndrickx, A. (Dep. Toxicol., State Univ. Ghent, B-9000 Ghent, Belgium) **Comparative study of the gas-liquid chromatographic behaviour of the pentafluorobenzyl esters and the methyl esters of ten chlorophenoxyalkyl acids.** *J. Chromatogr.* 157(1): 97-110; 1978. (57 references)

The gas-liquid chromatographic (GLC) behaviour of the pentafluorobenzyl and methyl esters of ten structurally related chlorophenoxyalkyl acids was studied by comparing their retention indices on nine frequently used liquid phases with increasing McReynolds constants. Nine of the compounds studied were herbicides: 2,4-D; 2,4-DB; dichloroprop; 2,4,5-T; 2,4,5-TB; silvex; MCPA; MCPB; and mecoprop. The resolution of each liquid phase is different for the pentafluorobenzyl and the methyl ester derivatives. However, using an apolar and a polar phase, a graph of the retention index (I) on the apolar phase against the difference in retention indice (ΔI) between the polar and the non-polar phase, shows a good correlation between structure and retention in gas-liquid chromatography. The graphs constructed for the pentafluorobenzyl and for the methyl esters have the same structure-retention correlations. (Author abstract by permission)

79-0742. Jackson, J. W.; Thomas, T. C. (Occupat. & Environ. Health Lab., USAF, McClellan AFB, Sacramento, CA 95652) **A simple and inexpensive method for sampling 2,4-D and 2,4,5-T herbicides from air.** *J. Air Pollut. Control Assoc.* 28(11): 1145-1147; 1978. (1 reference)

Chromosorb 120 (60/80 mesh), a polystyrene- divinylbenzene copolymer, was used in the detection of herbicides 2,4-D and 2,4,5-T. Sampling tubes can easily be made from glass tubes and glass wool. The dwell time of sample gas in the Chromosorb 102 plug should equal or exceed 5 msec. In a 0.64 cm I.D. tube packed 2.54 cm in length with Chromosorb 102, a sampling rate of 10 l/m or less will assure efficient collection. Larger sampling rates will require a large volume of Chromosorb 102 or use of a dwell time of less than 5 msec. Vapor concentrations used in these studies ranged from 10 $\mu g/m^3$ to 11 ng/m^3.

79-0743. Ramakrishna, N.; Ramachandran, B. V. (Indian Drug Res. Lab., Poona 411005, India) **Colorimetric determination of fenitrothion and methyl parathion using a hydroxylaminolytic procedure.** *J. Indian Chem. Soc.* 60(2): 185-187; 1978. (20 references)

A procedure is described for the spectrophotometric determination of fenitrothion and methyl parathion. The method is based on the liberation of PNC and PNP from fenitrothion and methyl parathion by 0.5 *N* sodium hydroxide and 0.67 *M* hydroxylamine. The method employed is a simple one avoiding drastic chemical steps involved in currently used methods. The sensitivity of the method is about 0.1 μM and it can be used for the determinations of the two insecticides in technical preparations, formulations and enzymic digests.

79-0744. Pilenkova, I. I.; Fat'ianova, A. D. (All-Union Sci. Res. Inst. Chem. Plant Prot. Agents, Ufa, USSR) **Gazokhromatograficheskoe opredelenie ostatkov 2,4-DP v vozdukhe, vode i pochve. [Gas-chromatographic determination of 2,4-DP in air, water and soil.]** *Khim. Sel'sk. Khoz.* 15(5): 12; 1978. (Russian)

A method for the gas-chromatographic determination of 2,4-DP (dichloroprop) in air, water and soil is described. Air-borne 2,4-DP is adsorbed in cotton impregnated with diethyl ether. The samples are acidified, and 2,4-DP is extracted with chloroform. The 2,4-D is methylated with diazomethane, and is determined on a gas chromatograph with constant recombination detector. A column temperature of 186°C, and a detector temperature of 250°C are used. The retention time of 2,4-D is 4.6 min. The detection is linear in the concentration range of 0.002-0.050 μg. The sensitivity of the method is 0.0005-0.01 mg/l in water, 0.005-0.01 mg/m^3 in air, and 0.05-0.1 mg/kg in soil. The recovery rate is 90 ± 3% from water, 83 ± 4% from air, and 85 ± 4% from soil.

79-0745. Natl. Res. Coun., Washington, DC **Analytical studies for the U.S. Environmental Protection Agency. Vol. 7. Pesticide decision making.** *Natl. Tech. Inform. Serv.* PB-279,535; 125p.; 1978. (44 references)

The report assesses the role of scientists and technicians in implementing the amended Federal Insecticide and Rodenticide Act. Also include are: reviews of risk/benefit assessments in pesticide regulations; exemptions from EPA regulations; the scientific input into the administrative hearings held by EPA to determine whether the use of a pesticide should be cancelled or suspended; and EPA's conduct of its responsibility to establish tolerance for pesticide residues under the Federal Food, Drug, and Cosmetics Act. (Author abstract by permission)

79-0746. Johansson, C. E. (Natl. Swedish Food Adm., Uppsala, Sweden) **A multiresidue analytical method for determining organochlorine, organophosphorus, dinitrophenyl and carbamate pesticides in apples.** *Pestic. Sci.* 9(4): 313-322; 1978. (12 references)

A multiresidue analytical method for the simultaneous extraction of organochlorine, organophosphorus, dinitrophenyl and carbamate pesticides from apples is presented. Extraction is performed with a mixture of toluene and hexane. After clean-up a Florisil column, and in some cases conversion to derivatives, quantitative determination is performed by electron-capture gas chromatography. Qualitative verification is performed by thin-layer chromatography or gas chromatography-mass spectrometry. (Author abstract by permission)

79-0747. Bowmer, K. H.; Adeney, J. A. (Div. Irrigat. Res., CSIRO, Griffith, New South Wales, Australia) **Residues of diuron and phytotoxic degradation products in aquatic situations. I. Analytical methods for soil and water.** *Pestic. Sci.* 9(4): 342-353; 1978. (22 references)

Thin-layer and gas-liquid chromatography, ultraviolet analysis and bioassay with *Chlorella* spp. have been used to investigate the pathway of degradation of diuron to phytotoxic derivatives when diuron was used as a soil-residual herbicide in irrigation canals. Observations suggest that 1-(3,4-dichlorophenyl)- 3-methylurea and 1-(3,4- dichlorophenyl) urea make a contribution to total residues equivalent to a maximum of about 40 and 55%, respectively, of diuron concentrations. Application of a phytotoxicity rating suggests that in this environment, measurement of diuron specifically would underestimate the total phytotoxicity of residues by a maximum of about 7%. (Author abstract by permission)

79-0748. Gordts, L.; Van Cauwenberge, P.; Hiernaux, G. (Inst. Hyg. & Epidemiol., B-1050 Bruxelles, Belgium) **Determination du brome residuel dans des plantes medicinales apres fumigation avec le bromure de methyle a l'aide de la spectrometrie de fluorescence par rayons X. [Determination of bromine residues in medicinal herbs following their fumigation with methyl bromide by X-ray fluorescence spectrometry.]** *Trav. Soc. Pharm. Montpellier* 38(2): 193-198; 1978. (6 references) (French)

Determination of residual bromine by X-ray fluorescence spectrometry in medicinal herbs, fumigated by methyl

bromide to rid them of insects, their eggs or larvae, revealed that the bromide residues pose no health hazard. Differences in Br content in untreated and treated plant materials levels usually do not exceed (Belgian) maximum permissible levels of 50 mg/kg for cereals, cocoa beans, nuts and almonds and of 30 mg/kg for root and leaf vegetables. This method is preferable to the neutron activation method which requires expensive equipment, and the colorimetric method which is time consuming. Mint is used in the preparation of the reference standard to avoid potential errors due to absorption or fluorescence caused by other chemical elements in the sample. A known quantity of LiBr is added to the mint and the desired standard is obtained by dilution with additional amounts of pure mint powder.

79-0749. Kofman, I. Sh.; Kofanov, V. I. (Inst. Colloid & Water Chem., Ukrainian SSR Acad. Sci., Kiev, USSR) **Sistematicheskii analiz mikrokolichestv nekotorykh pestitsidov razlichnoi khimicheskoi prirody v ob'ektakh okruzhayushchei sredy metodom gazovoi khromatografii. [Systematic gas-chromatographic analysis of trace amounts of various pesticides in the environment.]** *Ukr. Khim. Zh. (Russ. Ed.)* 44(8): 869-875; 1978. (12 references) (Russian)

The separation of pesticides of four different chemical groups from organic solvents is described. Group 1 includes the halogenated hydrocarbon derivatives (DDT, lindane, heptachlor, aldrin); group 2 is comprised of compounds containing primary and secondary amino groups (atrazine, simazine, prometryne, pyramine, ametryne, semeron); group 3 preparations contain free acid groups or their salts (2,4-D, dicamba, TCA, dalapon), and group 4 includes the esters, amides, tertiary amines, polyfunctional and heterocyclic compounds (metaphos, phosphamide, treflan, 2,4-D butyl ester, linuron, and betanal). From organic solutions containing preparations of all four groups, the compounds of group 2 are separated by means of an acid extractant, those of group 3 by means of an alkaline solution, after which the pesticides of group 4 are separated from those of group 1 by means of concentrated sulfuric acid. The preparations are determined by means of ion-specific detectors.

79-0750. Polzhofer, K. (NATEC, D-2000 Hamburg 50, BRD) **Bestimmung von MCPA und TERBACIL in Apfeln. [Determination of MCPA and terbacil in apples.]** *Z. Lebensm. Unters. Forsch.* 167(3): 162-164; 1978. (5 references) (German)

Methods for the detection of MCPA and terbacil in apples are described. Following extraction with hexane-diethyl ether and reextraction with trichloromethane, MCPA is determined by thin-layer chromatography on silica gel, using diethyl ether, methanol and water at a ratio of 94:4.5:1.5 as the solvent system. The MCPA content is determined densitometrically at 278 nm. Terbacil is extracted with ethylacetate, and it is determined after sweep- codisillation and elution with ethyl acetate by gas-liquid chromatography with electron capture detector. The detection limits are 0.04 mg/kg for terbacil and 0.1 mg/kg for MCPA. In a concentration range of 0.05-0.1 mg/kg, terbacil is recovered at a rate of 95-105%. The recovery rate is 103-114% for MCPA in the concentration range of 0.1-0.5 mg/kg.

See also **79-0573** *and* **79-0670.**

PESTICIDES ABSTRACTS

QUARTERLY INDEX

JANUARY–MARCH 1979 Vol. 12 Nos. 1-3

PREFACE

The basic design for this index was supplied by the Technical Services Division, Office of Pesticide Programs, Environmental Protection Agency. It consists of two subject indexes (concept and compound) and two author indexes (personal and corporate). Primary and secondary headings in the Concept Index appear as subordinate headings in the Compound Index, both indexes having three levels of specificity.

In the Concept Index, only general aspects are indexed under the broader terms shown below. For specific terms, the reader should consult the appropriate heading in the Concept Index, selecting the narrower term that best fits his need.

Compounds are indexed by their common names; where other compound designations are used by authors, these synonyms appear with the notation to *see* the common name. Articles referring, in general, to structural or functional chemical classes are indexed under the broader headings (e.g., organochlorines, herbicides, etc).

Alternative controls
Analysis
Beneficial effects
Biochemical effects (*see also* Enzyme activity)
Blood/body fluids
Carcinogenesis
Cardiovascular system
Cytological effects
Digestive system
Economics
Endocrine system (*see also* Reproduction/growth)
Environmental pollution
Enzyme activity (*see also* Biochemical effects)
Excretory system
Experimental design
Factors influencing metabolism/toxicity
Immunology
Integumentary system
Laws and regulations
Metabolism (*see also* Residue degradation)
Morbidity and mortality statistics
Musculoskeletal system
Mutagenesis/teratogenesis (*see also* Cytological effects)
Nervous system
Nomenclature
Photodecomposition (*see also* Residue degradation)
Poison control centers
Prevention
Reproduction/growth (*see also* Endocrine system)
Residue degradation (*see also* Photodecomposition *and* Metabolism)
Residue dynamics
Residue removal
Residues/air
Residues/non-target organisms
Residues/food and feed
Residues/human
Residues/plants
Residues/soil
Residues/water
Respiratory system
Reticuloendothelial system
Reviews
Safety standards
Sensory system
Therapeutic use
Toxicity/non-target organisms
Toxicity/experimental animals
Toxicity/humans
Treatment of poisoning

Subject Index: Concepts

Absorption
see also Metabolism
Chicken
Hexachlorobenzene, 79-0414
Leptophos, 79-0184
Organochlorines, 79-0149
Cow
Chlorpyrifos, 79-0416
IPO-63, 79-0724
Trichlorfon, 79-0724
Fish
Diazinon, 79-0643
Organophosphates, 79-0399
Molluscs
Diazinon, 79-0643
Plankton/algae
Dieldrin, 79-0371
Plants
Monolinuron, 79-0190
Rabbit
Aldrin, 79-0380
Amitrole, 79-0707
Buturon, 79-0380
Carbaryl, 79-0707
4-Chloroaniline, 79-0380
DDT, 79-0707
Dieldrin, 79-0707
Malathion, 79-0707
Parathion, 79-0707
PCP, 79-0380
Trichlorophenol, 79-0380
Rat
Chlorpyrifos, 79-0698
Cycloate, 79-0667
Dimuron, 79-0435
Molinate, 79-0667
Pebulate, 79-0667

Adrenal
Animals/experimental
Lindane, 79-0214
Organochlorines, 79-0214
Human
Lindane, 79-0214
Organochlorines, 79-0214
In vitro
DDE, 79-0410
TDE, 79-0410

Alimentary tract
see also Digestive system
Animals/experimental
Carbaryl, 79-0111
Chlorfenvinphos, 79-0111
DDT, 79-0614

Allergy
see Immunology

Alternative controls, 79-0002, 79-0008 79-0013, 79-0014, 79-0501 79-0502

Amino acids/peptides/proteins
see also Biochemical effects
Animals/experimental
Biphenyl, 79-0129
DDE, 79-0122
DDT, 79-0122, 79-0369
DDT derived compounds 79-0122
In vitro
DDE, 79-0712
DDT, 79-0712
Methoxychlor, 79-0712

Analysis
see also Bioassay; Chromatography; Electrometry; Enzyme assay; Spectrometry; Titration
General
DDT, 79-0705
Piperonyl butoxide, 79-0499
Sample preparation, 79-0240 79-0726
Biphenyl, 79-0222
Carbamates, 79-0487
Carbaryl, 79-0475
2,4-D, 79-0742
Decamethrin, 79-0500
Dioxins, 79-0224
Disparlure, 79-0473
Ethylene thiourea, 79-0474
Fenitrothion, 79-0486
Herbicides, 79-0238, 79-0749
Metribuzin, 79-0496
Organochlorines, 79-0228 79-0733, 79-0749
Organophosphates, 79-0487 79-0733, 79-0749
2,4,5-T, 79-0224, 79-0742
2,3,6-TBA, 79-0479

Androgens
see also Reproduction/growth
Animals/experimental
Dieldrin, 79-0385
Parathion, 79-0385

Behavior
see also Nervous system
Animals/experimental
Methyl parathion, 79-0720
Organophosphates, 79-0699

Bibliographies
Analysis, 79-0220

Bile
see also Blood/body fluids
Animals/experimental
Polychloropinene, 79-0661

Bioassay
see also Analysis 79-0244
Acrolein, 79-0476
Chlordane, 79-0357
Diuron, 79-0747
Fenitrothion, 79-0357, 79-0469
Heavy metals, 79-0469
Herbicides, 79-0249, 79-0468
Methomyl, 79-0469
Organophosphates, 79-0704
Quinalphos, 79-0357
Thiometon, 79-0357

Biochemical effects
see also Amino acids/peptides/proteins; Carbohydrates; Catecholamines; Electrolytes; Lipids/steroids/sterols; Nucleic acids; Porphyrins/pigments; Respiration, cellular; Vitamins/coenzymes
Animals/experimental
Carbaryl, 79-0199
DAEP, 79-0375
DDT, 79-0405
Dieldrin, 79-0123
Diflubenzuron, 79-0445
Dioxins, 79-0087, 79-0180
Iomex, 79-0400
Malathion, 79-0405
Mirex, 79-0187
Organochlorines, 79-0087
Paraquat, 79-0657
Microorganisms
Carbendazim, 79-0194
Dichlofluanid, 79-0194
Tridemorph, 79-0194

Biotransformation
see also Metabolism
General
Trichlorfon, 79-0621
Animals/experimental
Trichlorfon, 79-0622
Chicken
Permethrin, 79-0415
Fish
Chlordecone, 79-0118
Malathion, 79-0145
Human
BHC isomers, 79-0406
Chlorpyrifos, 79-0573
DDT isomers, 79-0406
Dicrotophos, 79-0573
Malathion, 79-0573
Parathion, 79-0573
Ronnel, 79-0573
In vitro
2,4-D, 79-0150
DDT, 79-0705
Herbicide derived compounds 79-0627
Methoxychlor, 79-0630
Paraoxon, 79-0623
Parathion, 79-0623
Microorganisms
Chlorbromuron, 79-0351
Fluometuron, 79-0439
Herbicides, 79-0438, 79-0669
Organochlorines, 79-0722
Organophosphate derived compounds, 79-0620

Biotransformation (cont'd)
Mouse
EPN, 79-0734
Fenitrothion, 79-0734
Malathion, 79-0734
Parathion, 79-0734
Plankton/algae
Herbicides, 79-0349
Plants
Carbamates, 79-0433
Chloramben, 79-0670
2,4-D, 79-0150
Herbicides, 79-0124
Hexachlorobenzene, 79-0115
Lindane, 79-0115, 79-0639
Mephospholan, 79-0671
Monolinuron, 79-0190
Monuron derived compounds 79-0522
Thiophanate-methyl, 79-0432
Rat
Chlordimeform, 79-0659
Cycloate, 79-0667
Molinate, 79-0155, 79-0667
Pebulate, 79-0667
Soil
Carbamates, 79-0433

Blood/body fluids
see also Bile; Blood cells; Plasma/serum
Animals/experimental
Warfarin, 79-0206

Blood cells
see also Blood/body fluids
Animals/experimental
Fenitrothion, 79-0402
Hexachlorobenzene, 79-0170
Human, 79-0327
Chlordane, 79-0578
DDT, 79-0578
Lindane, 79-0578
In vitro
DFP, 79-0104
Hexachlorobenzene, 79-0170

Blood pressure
see also Cardiovascular system
Animals/experimental
Mevinphos, 79-0615

Brain
see also Nervous system
Animals/experimental
BHC isomers, 79-0715
Cismethrin, 79-0362
DDT, 79-0132, 79-0362
Decamethrin, 79-0362
Dichlorvos, 79-0368
Disulfoton, 79-0197
Ethylmercuric *p*-toluenesulfanilide 79-0663
Lindane, 79-0715
Oxydemeton methyl, 79-0634
Soman, 79-0355
Tin compounds, 79-0678
Trichlorfon, 79-0368, 79-0634
Human

Brain (cont'd)
Paraquat, 79-0604
In vitro
Chlordecone, 79-0444, 79-0708
Tin compounds, 79-0678

Carbohydrates
see also Biochemical effects
Animals/experimental
BHC, 79-0205
Chlorfenvinphos, 79-0635
DDT, 79-0614

Carcinogenesis
General
Dioxins, 79-0085
Organochlorines, 79-0128
Animals/experimental
Azinphosmethyl, 79-0674
BHC isomers, 79-0137
Dieldrin, 79-0169
Dioxins, 79-0175, 79-0176
Malathion, 79-0685
Nitrofen, 79-0674
Organochlorines, 79-0451
Paraquat, 79-0641
Polychlorinated biphenyls 79-0687
Rotenone, 79-0710
Trichlorfon, 79-0103
Human
Arsenicals, 79-0575
DBCP, 79-0182
DDT derived compounds 79-0514
Dieldrin, 79-0514
Lindane, 79-0514
Microorganisms, 79-0427

Cardiovascular system
see also Blood pressure
Animals/experimental
Polyoxin D, 79-0183

Cartilage
see also Musculoskeletal system
Animals/experimental
Paraquat, 79-0363

Catecholamines
see also Biochemical effects
Animals/experimental
Lindane, 79-0214
Organochlorines, 79-0214
Human
Lindane, 79-0214
Organochlorines, 79-0214
In vitro
Chlordecone, 79-0444

Chromatography
see also Analysis
General
Decamethrin, 79-0500
Column
Chlordane, 79-0737
Toxaphene, 79-0737
Gas-liquid, 79-0229, 79-0231 79-0483
Ametryne, 79-0728

Chromatography (cont'd)
Atrazine, 79-0728
Azobenzene, 79-0471
BHC, 79-0482
BHC isomers, 79-0482, 79-0492
Biphenyl, 79-0222
Bromoxynil octanoate, 79-0494
Carbamates, 79-0746
Carboxin, 79-0477
Chlorpyrifos, 79-0471
2,4-D, 79-0245, 79-0472
DDT, 79-0726
Diazinon, 79-0471
Dichlorprop, 79-0744
Dioxins, 79-0224, 79-0241
Diquat, 79-0478
Disparlure, 79-0473
Diuron, 79-0747
Fensulfothion, 79-0731
Fenthion, 79-0233
Herbicides, 79-0741
Hexachlorobenzene, 79-0243
Lindane, 79-0482
Malathion, 79-0471
MCPA, 79-0494
Mercurials, 79-0247
Methyl parathion, 79-0471
Metribuzin, 79-0496
Nitro compounds, 79-0746
Organochlorines, 79-0225 79-0228, 79-0243, 79-0481 79-0485, 79-0488, 79-0733 79-0746
Organophosphates, 79-0230 79-0733, 79-0746
Oryzalin, 79-0480
Oxycarboxin, 79-0477
Paraquat, 79-0235
PCP, 79-0489
Phenamiphos, 79-0731
Polychlorinated biphenyls 79-0481
Polychloropinene, 79-0289
Prometryne, 79-0728
Propazine, 79-0728
Pyrethrins, 79-0237
Quazatine, 79-0497
Rodenticides, 79-0221
2,4,5-T, 79-0224, 79-0245
2,3,6-TBA, 79-0479
Terbacil, 79-0750
Trifluralin, 79-0728
Vamidothion, 79-0732
HPL, 79-0229, 79-0234, 79-0484
BHC, 79-0482
BHC isomers, 79-0482
2,4-D, 79-0472, 79-0490
Lindane, 79-0482
Paraquat, 79-0235
Thin-layer
Carbamates, 79-0746
Carbaryl, 79-0475
Diuron, 79-0747
Glyphosate, 79-0226
Hexachlorobenzene, 79-0243
MCPA, 79-0750
Nitro compounds, 79-0746

Chromatography (cont'd)
Organochlorines, 79-0225
79-0236, 79-0243, 79-0746
Organophosphates, 79-0236
79-0746
Paraquat, 79-0235
Phosalone, 79-0248
Phosmet, 79-0248
Pirimicarb, 79-0495
Toxaphene, 79-0250

Chromosomes/genes
see also Cytological effects
Animals/experimental
Captan, 79-0168
In vitro
Folpet, 79-0121
Plants
Demeton-O-methyl, 79-0666
Herbicides, 79-0139

Cytological effects
see also Chromosomes/genes; Endoplasmic reticulum; Fibroblasts; Microsomes; Microtubules; Mitochondria; Mitosis/meiosis
General
Tributyltin, 79-0099
Triphenyltin, 79-0099
In vitro
Dinobuton, 79-0140
Phosphamidon, 79-0140

Diagnosis
see Treatment of poisoning

Digestive glands
see also Digestive system
Human, 79-0094

Digestive system
see also Alimentary tract; Digestive glands; Liver; Pancreas (exocrine)
Animals/experimental
Thiram, 79-0662
Zineb, 79-0662
Human
Organochlorines, 79-0069

Distribution/storage
see also Metabolism
General
Chlordecone, 79-0172
Dioxins, 79-0172
Chicken
Hexachlorobenzene, 79-0414
Organochlorines, 79-0149
Cow
Chlorpyrifos, 79-0416
Excretion
Leptophos, 79-0457
Mouse
3-Chloro-*p*-toluidine, 79-0713
Rabbit
Aldrin, 79-0380
Amitrole, 79-0707
Buturon, 79-0380
Carbaryl, 79-0707
4-Chloroaniline, 79-0380

Distribution/storage (cont'd)
DDT, 79-0707
Dieldrin, 79-0707
Malathion, 79-0707
Parathion, 79-0707
PCP, 79-0380
Trichlorophenol, 79-0380
Rat
Chlorpyrifos, 79-0698
Cycloate, 79-0667
Fenitrothion, 79-0694
Leptophos, 79-0694
Mirex, 79-0133
Molinate, 79-0667
Pebulate, 79-0667
Sheep
Hexachlorobenzene, 79-0675
IBP, 79-0211
Turkey
Dieldrin, 79-0195, 79-0353

Economics, 79-0251, 79-0506
Fungicides, 79-0253
Herbicides, 79-0253

EEG
Animals/experimental
Propoxur, 79-0644

Eggshell effects
see also Reproduction/growth
Animals/experimental
DDE, 79-0358
DDT, 79-0358, 79-0684
Animals/non-target
DDT, 79-0554
Polychlorinated biphenyls
79-0554

Electrolytes
see also Biochemical effects
Animals/experimental
Carbaryl, 79-0198
Chlorfenvinphos, 79-0198
DDT, 79-0136, 79-0193
Dioxins, 79-0193

Electrometry
see also Analysis
Conductometry
Organochlorines, 79-0485
Polarography
Acrolein, 79-0476
Chlordimeform, 79-0727
Mephospholan, 79-0727
Phospholan, 79-0727

Embryo/fetus
see also Reproduction/growth
Animals/experimental
Captan, 79-0113
2,4-D, 79-0446
Diazinon, 79-0203
Dichlorvos, 79-0208
Dimethoate, 79-0148
Ethylene dibromide, 79-0717
Folpet, 79-0113
Propoxur, 79-0644

Endocrine system
see Adrenal; Pancreas (endocrine); Thyroid

Endoplasmic reticulum
see also Cytological effects
Animals/experimental
BHC isomers, 79-0137
Carbon tetrachloride, 79-0458
Cycloheximide, 79-0458
DEDTC, 79-0458

Environmental pollution, 79-0009
79-0010
Herbicides, 79-0257
Organochlorines, 79-0254, 79-0465
79-0607
Organophosphates, 79-0254
Polychlorinated biphenyls, 79-0174
79-0507
2,4,5-T, 79-0256

Enzyme activity
General
BHC isomers, 79-0407
Carbaryl, 79-0111
Chlorfenvinphos, 79-0111
79-0367
Cycloate, 79-0142
Diazinon, 79-0203
Dioxins, 79-0179
Disulfoton, 79-0144
Endrin, 79-0116
Ethylmercuric *p*-toluenesulfanilide
79-0663
Fenitrothion, 79-0408
Fungicides, 79-0202
Herbicides, 79-0202, 79-0709
Hexachlorobenzene, 79-0645
Lindane, 79-0387
Malathion, 79-0145
Organophosphates, 79-0399
Paraoxon, 79-0106
Parathion, 79-0387
Soman, 79-0355
Acid phosphatase
BHC, 79-0404
Disulfoton, 79-0404
Endrin, 79-0404, 79-0637
Leptophos, 79-0207, 79-0628
Malathion, 79-0404
Propoxur, 79-0404
ALA-synthetase
Disulfoton, 79-0403
Propoxur, 79-0403
Aldehyde dehydrogenase
DDT, 79-0631
Dioxins, 79-0631
Mirex, 79-0631
Polychlorinated biphenyls
79-0631
Aliesterase
DEF, 79-0452
Fenitrothion, 79-0398
Tri-*o*-cresyl phosphate, 79-0452
Alkaline phosphatase
BHC, 79-0404
Dieldrin, 79-0147
Disulfoton, 79-0404

Enzyme activity (cont'd)
Endrin, 79-0404, 79-0637
Pyrethrum, 79-0392
Aryl hydrocarbon hydroxylase
DDT, 79-0193, 79-0629
Dieldrin, 79-0629
Dioxins, 79-0193, 79-0629
Hexachlorobenzene, 79-0629
ATPase
Aldrin, 79-0714
Carbofuran, 79-0401
DAEP, 79-0375
DDT, 79-0135
Dieldrin, 79-0714
Carbonate dehydratase
Heavy metals, 79-0449
Zineb, 79-0449
Catalases
Amitrole, 79-0673
Cholinesterase, 79-0342
Armine, 79-0651, 79-0672
Carbaryl, 79-0450
Carbofuran, 79-0401
DAEP, 79-0375
DFP, 79-0104, 79-0677
Dichlorvos, 79-0373, 79-0374
Fenitrothion, 79-0077, 79-0402
Gd-42, 79-0651
IBP, 79-0211
Leptophos, 79-0207, 79-0694
Methamidophos, 79-0706
Methyl parathion, 79-0196
Obidoxime, 79-0672
Organophosphates, 79-0450
79-0632
Parathion, 79-0459
Propoxur, 79-0200
Triton X-100, 79-0665
Collagenase
Parathion, 79-0109
Cytochrome oxidase
Disulfoton, 79-0403
Endrin, 79-0403
Propoxur, 79-0403
Trichloronate, 79-0098
Cytochrome P-450
Biphenyl, 79-0129
Carbon disulfide, 79-0192
Carbon tetrachloride, 79-0192
DDE, 79-0122
DDT, 79-0122
DDT derived compounds
79-0122
Mirex, 79-0187
Glucose 6-phosphate dehydrogenase
Dichlorvos, 79-0368
Glucose 6-phosphate dehydrogenase
Endrin, 79-0637
Trichlorfon, 79-0368
β-Glucuronidase
DFP analogs, 79-0143
Glutathione *S*-transferase
Diazinon, 79-0411
3,4-Dichloronitrobenzene, 79-0411
Methyl iodide, 79-0411
Methyl parathion, 79-0411
GPT
Enzyme activity (cont'd)
BHC, 79-0205
DDE, 79-0122
DDT, 79-0122
DDT derived compounds
79-0122
Lysozyme
DFP analogs, 79-0143
Mixed function oxidases
Biphenyl, 79-0129
Carbamates, 79-0437
DDT, 79-0356, 79-0396, 79-0642
Dioxins, 79-0456
Fungicides, 79-0719
Lindane, 79-0396
Milbex, 79-0396
Phosalone, 79-0396
Polychlorinated biphenyls
79-0356
Thiram, 79-0396
Toxaphene, 79-0396
Monoamine oxidase
Chlordimeform, 79-0659
DDT, 79-0112
Dioxins, 79-0177
Paraoxonase
Paraoxon, 79-0680
Peroxidase
Methyl parathion, 79-0196
Tryptophan pyrolase
DFP, 79-0105
UDP-Glucuronyltransferase
Dioxins, 79-0378
Enzyme assay
see also Analysis
Cholinesterase, 79-0246, 79-0470
79-0665, 79-0738
Estrogens
see also Reproduction/growth
Animals/experimental
Dioxins, 79-0178
Methoxychlor, 79-0630
Excretion
see also Metabolism
Chicken
Dieldrin, 79-0359
Permethrin, 79-0415
Cow
BHC isomers, 79-0167
Lindane, 79-0167
Distribution/storage
Leptophos, 79-0457
In vitro
2,4-D, 79-0461
Mouse
Cypermethrin, 79-0466
Rat
2,4-D, 79-0679
Dimuron, 79-0435
Fenitrothion, 79-0694
Herbicides, 79-0153
Leptophos, 79-0694
Mirex, 79-0133
2,4,5-T, 79-0679
Warfarin, 79-0422
Sheep
Excretion (cont'd)
Hexachlorobenzene, 79-0675
Turkey
Dieldrin, 79-0195
Excretory system
see Kidney
Experimental design
Analysis
Carbamates, 79-0487
2,4-D, 79-0472
Organochlorines, 79-0488
Organophosphates, 79-0487
Paraquat, 79-0463
Monitoring and residues
Benthiocarb, 79-0309
Carbaryl, 79-0475
Chlorpyrifos, 79-0269
CNP, 79-0309
Dioxins, 79-0264
Disparlure, 79-0473
Ethylene thiourea, 79-0474
Heptachlor, 79-0265
Paraoxon, 79-0447
Parathion, 79-0447
Polychlorinated biphenyls
79-0265
Toxicology and pharmacology
79-0388, 79-0427
Allethrin, 79-0412
Captafol, 79-0426
DDE, 79-0424
Heavy metals, 79-0424
Hexachlorobenzene, 79-0654
Organophosphates, 79-0704
Paraoxon, 79-0447
Parathion, 79-0447, 79-0459
PCP, 79-0423
(3α-Phenyl-β-acetylene)-4-
hydroxycoumarin, 79-0395
Pyrethrins, 79-0412
Thallium, 79-0467
Factors influencing metabolism/toxicity
General
Carbophenothion, 79-0299
DDT, 79-0547
Ethion, 79-0299
Parathion, 79-0299
2,4,5-T, 79-0360
Age
Dimethoate, 79-0148
Biological magnification
Diazinon, 79-0643
Organochlorines, 79-0568
Polychlorinated biphenyls
79-0568
Disease state, 79-0076
BHC isomers, 79-0137
Carbon tetrachloride, 79-0127
Chlordane, 79-0127
DDT, 79-0126
Fenitrothion, 79-0125, 79-0126
Organochlorines, 79-0075
Organophosphates, 79-0075
Formulation
DDT, 79-0126
Fenitrothion, 79-0125, 79-0126

Factors influencing metabolism/toxicity (cont'd)
PCP, 79-0716
Trifluralin, 79-0640
Interactions
Armine, 79-0651, 79-0672
Atrazine, 79-0386
BHC isomers, 79-0137, 79-0664 79-0715
Carbamates, 79-0386
Carbon tetrachloride, 79-0127 79-0441, 79-0458
Chlordane, 79-0127
Chlordecone, 79-0441
Chlormequat chloride, 79-0616 79-0617
Cycloheximide, 79-0458
2,4-D, 79-0617
DDT, 79-0126, 79-0616
DEDTC, 79-0458
Demeton-O-methyl, 79-0666
DFP, 79-0105
Diazinon, 79-0386
Dioxins, 79-0131
DSMA, 79-0455
EPN, 79-0734
Ethylene thiourea, 79-0649
Fenitrothion, 79-0125, 79-0126 79-0734
Gd-42, 79-0651
Lauryl sulfate, 79-0701
Lindane, 79-0715
Linuron, 79-0350
Malathion, 79-0734
Mercurials, 79-0455
Methyl parathion, 79-0196
Obidoxime, 79-0672
Organophosphates, 79-0151
Paraquat, 79-0641
Parathion, 79-0386, 79-0734
o-Phenylphenol, 79-0701
Polychloropinene, 79-0661
Prothoate, 79-0350
SKF-525A, 79-0443
Sodium bromide, 79-0649
Molting
PCP, 79-0120
Nutritional state
BHC, 79-0703
Carbaryl, 79-0198
Chlorfenvinphos, 79-0198
DDT, 79-0136, 79-0541, 79-0703
Dieldrin, 79-0195
Lindane, 79-0138
Mirex, 79-0462
Polychlorinated biphenyls 79-0703
pH
Organophosphates, 79-0632
Pregnancy
Ethylene dibromide, 79-0717
Route
EDMM, 79-0613
Trifluralin, 79-0640
Schedule of dosage
Chlorfenvinphos, 79-0367
Fenitrothion, 79-0398

Factors influencing metabolism/toxicity (cont'd)
Leptophos, 79-0184
Sex
BHC, 79-0404
Disulfoton, 79-0403, 79-0404
Endrin, 79-0404
Malathion, 79-0404
Nitrofen, 79-0674
Propoxur, 79-0404
Structure/function
Paraoxon, 79-0680
Taxon
Amitrole, 79-0673
Biphenyl, 79-0173
DDE, 79-0638
DDT, 79-0638, 79-0642
Dieldrin, 79-0397
Dioxins, 79-0173
Ethylene dibromide, 79-0717
2,4,5-T, 79-0676

Fertility/sterility
see also Reproduction/growth
Animals/experimental
Chlordecone, 79-0382
Dioxins, 79-0178
Hexachlorobenzene, 79-0414
IPO-63, 79-0724
Mirex, 79-0462
Polyoxin D, 79-0693
Trichlorfon, 79-0724
Plants
Herbicides, 79-0139

Fibroblasts
see also Cytological effects
Animals/experimental
Dioxins, 79-0378
In vitro
Chlorpropham, 79-0660

Gametogenesis
see also Reproduction/growth
Animals/experimental
Carbaryl, 79-0146
Fenitrothion, 79-0146
IPO-63, 79-0724
Trichlorfon, 79-0724
Human
DBCP, 79-0580

Glands
Animals/experimental
Chlorpyrifos, 79-0704

Gravimetry
see Analysis

Growth
see also Reproduction/growth
Animals/experimental
BHC, 79-0205
Dicrotophos, 79-0130
Hexachlorobenzene, 79-0101
PCP, 79-0101
In vitro
Folpet, 79-0121
Microorganisms
Carbamates, 79-0095

Growth (cont'd)
Chlorpyrifos, 79-0117
Dieldrin, 79-0117
Fungicides, 79-0202
Herbicides, 79-0202
Maneb, 79-0117
Metachlor, 79-0536
Methyl isothiocyanate, 79-0117
Organochlorines, 79-0095
Organophosphates, 79-0095

Hair/fur
see also Integument
Animals/experimental
Thallium, 79-0418

Hormones
see also Reproduction/growth
Animals/experimental
Fenitrothion, 79-0636

Immunology
General, 79-0093
Animals/experimental
Allethrin, 79-0412
Ametryne, 79-0372
Calcium cyanimide, 79-0581
Carbaryl, 79-0372
Chlordimeform, 79-0372
Chlorfenvinphos, 79-0635
DDT, 79-0372
Diazinon, 79-0581
Dioxins, 79-0180
Hexachlorobenzene, 79-0170
Parathion, 79-0372
Pyrethrins, 79-0412
Strobane, 79-0581
Zineb, 79-0213
Human
Calcium cyanimide, 79-0581
Chlorothalonil, 79-0597
Cyanophos, 79-0597
Diazinon, 79-0581
Dichlorvos, 79-0597
Herbicides, 79-0609
Maneb, 79-0597
Organochlorines, 79-0609
Organophosphates, 79-0609
Paraquat, 79-0597
Salithion, 79-0597
Strobane, 79-0581
In vitro
Dioxins, 79-0181
Hexachlorobenzene, 79-0170

Integument
see also Hair/fur; Skin
Animals/experimental
PCP, 79-0120

Kidney
Animals/experimental
BHC, 79-0205
Maneb, 79-0119
Toxaphene, 79-0107
In vitro
2,4-D, 79-0461

Laws and regulations
Japan

Laws and regulations (cont'd)
BHC, 79-0255
DDT, 79-0255
Fungicides, 79-0498
Herbicides, 79-0498
Hexachlorobenzene, 79-0255
PCP, 79-0255
USA-EPA, 79-0503
2,4,5-T, 79-0256

Lipids/steroids/sterols
see also Biochemical effects
Animals/experimental
BHC, 79-0703
Biphenyl, 79-0129
Carbaryl, 79-0198
Chlorfenvinphos, 79-0198
DDE, 79-0122
DDT, 79-0122, 79-0132, 79-0703
DDT derived compounds 79-0122
Dieldrin, 79-0147
Disulfoton, 79-0144, 79-0197
Fenitrothion, 79-0695
Polychlorinated biphenyls 79-0703
Tri-*o*-cresyl phosphate, 79-0721
In vitro
DDE, 79-0410, 79-0712
DDT, 79-0712
Fenitrothion, 79-0695
Methoxychlor, 79-0712
TDE, 79-0410

Liver
see also Digestive system
Animals/experimental
BHC, 79-0205
BHC isomers, 79-0664
Carbon tetrachloride, 79-0127 79-0458
Chlordane, 79-0127
Cycloheximide, 79-0458
DDE, 79-0122
DDT, 79-0122, 79-0132, 79-0396
DDT derived compounds 79-0122
DEDTC, 79-0458
DFP, 79-0105
Dieldrin, 79-0123, 79-0147 79-0397
Dioxins, 79-0453
Endrin, 79-0648
Ethylene thiourea, 79-0649
Etrimfos, 79-0191
Lindane, 79-0387, 79-0396 79-0626
Milbex, 79-0396
Mirex, 79-0187, 79-0384
Parathion, 79-0387
PCP, 79-0716
Phosalone, 79-0396
Polychlorinated biphenyls 79-0453
Thiram, 79-0396
Toxaphene, 79-0396
Human, 79-0611
Organochlorines, 79-0069

Liver (cont'd)
In vitro
DFP, 79-0105
Lysosomes
Lindane, 79-0626

Lung
see also Respiratory system
Animals/experimental
Paraquat, 79-0110, 79-0656 79-0657
Animals/non-target
Paraquat, 79-0335
Human, 79-0605

Marrow
see also Reticuloendothelial system
Animals/experimental
Captan, 79-0168

Metabolism
see also Absorption; Biotransformation; Distribution/storage; Excretion
General
Chlordecone, 79-0172
Dioxins, 79-0172
Trichloronate, 79-0098
Animals/experimental
Hexachlorobenzene, 79-0101
PCP, 79-0101
Annelids
DDT, 79-0647
Dieldrin, 79-0647
Lindane, 79-0647
Fish
Clonitralide, 79-0160
Fenitrothion, 79-0408
In vitro
Carbamates, 79-0437
Chlordane, 79-0188
2,4-D, 79-0150
Etrimfos, 79-0191
Organophosphates, 79-0151
Insects
Fonofos, 79-0186
Methamidophos, 79-0706
Pyrethrins, 79-0157, 79-0189
Microorganisms
Asulam, 79-0161
2,4-D, 79-0162
Herbicides, 79-0669
Linuron, 79-0350
Organophosphates, 79-0683
Prothoate, 79-0350
Sulfanilamide, 79-0161
Warfarin, 79-0422
Mouse
Fonofos, 79-0186
Methamidophos, 79-0706
Plankton/algae
DDT, 79-0369
Plants
Chlorbromuron, 79-0164
2,4-D, 79-0150
Endosulfan, 79-0361
Herbicides, 79-0159
Linuron, 79-0535
Metobromuron, 79-0164

Metabolism (cont'd)
2,4,5-T, 79-0156, 79-0472
Rabbit
Chlordane, 79-0163
Endosulfan isomers, 79-0442
Oxychlordane, 79-0163
Rat
Buturon, 79-0393
Cycloate, 79-0142, 79-0394
Dimuron, 79-0435
Herbicides, 79-0153
Hexachlorobenzene, 79-0653
Lindane, 79-0138, 79-0652
Molinate, 79-0154, 79-0155 79-0394
Organophosphates, 79-0151
Pebulate, 79-0394
Phthalide, 79-0102
Turkey
Dieldrin, 79-0195

Microsomes
see also Cytological effects
General
Carbon disulfide, 79-0192
Carbon tetrachloride, 79-0192
Animals/experimental
BHC isomers, 79-0137
DDE, 79-0122
DDT, 79-0122
DDT derived compounds 79-0122
Dieldrin, 79-0123
Disulfoton, 79-0144
Endrin, 79-0116
Fenitrothion, 79-0434
Fungicides, 79-0719

Microtubules
see also Cytological effects
In vitro
Rotenone, 79-0633

Mitochondria
see also Cytological effects
Animals/experimental
DDT, 79-0112, 79-0381
Parathion, 79-0381
In vitro
Chlordecone, 79-0444
DDE, 79-0638
DDT, 79-0638
Tin compounds, 79-0097

Mitosis/meiosis
see also Cytological effects
In vitro
Chlorpropham, 79-0660
Plants
Herbicides, 79-0139

Morbidity and mortality statistics
Germany (DDR)
DNOC, 79-0345
Ireland
Paraquat, 79-0083
Italy
Dioxins, 79-0073
Japan
Organophosphates, 79-0332

Morbidity and mortality statistics (cont'd)
Organophosphates, 79-0333
USA, 79-0066, 79-0068, 79-0069 79-0329
Paraquat, 79-0343
USA-California
DBCP, 79-0067
USSR, 79-0080

Muscle, smooth
see also Musculoskeletal system
Animals/experimental
DDT, 79-0381
Parathion, 79-0381

Muscle, striated
see also Musculoskeletal system
Animals/experimental
DDT, 79-0689
In vitro
DFP, 79-0677

Musculoskeletal system
see also Cartilage; Muscle, smooth; Muscle, striated; Myocardium; Skeleton/bone
Animals/experimental
Polyoxin D, 79-0183
Human
Methyl bromide, 79-0089
Tri-*o*-cresyl phosphate, 79-0070

Mutagenesis/teratogenesis
General
Organochlorines, 79-0128
o-Phenylphenol, 79-0429
Animals/experimental
BHC, 79-0681
Captan, 79-0113, 79-0430
2,4-D, 79-0370, 79-0681
Diazinon, 79-0203
Dichlorvos, 79-0208
Dicrotophos, 79-0130
Dioxins, 79-0178, 79-0179
Folpet, 79-0113, 79-0121
Linuron, 79-0454
Malathion, 79-0454
Methoxychlor, 79-0454
Parathion, 79-0217
o-Phenylphenol, 79-0431
Picloram, 79-0370
Polyoxin D, 79-0693
2,4,5-T, 79-0360, 79-0370
Thiram, 79-0141
Human
2,4-D, 79-0082
DBCP, 79-0182
Dioxins, 79-0073, 79-0085
2,4,5-T, 79-0082
TDE, 79-0352
In vitro
Captan, 79-0430
Folpet, 79-0121
o-Phenylphenol, 79-0431
Microorganisms
Carbamates, 79-0730
Dichlorvos, 79-0379
Ferbam, 79-0428

Mutagenesis/teratogenesis (cont'd)
Organophosphates, 79-0730
Thiram, 79-0428
Ziram, 79-0428
Plants
Demeton-O-methyl, 79-0666

Myocardium
see also Musculoskeletal system
Animals/experimental
Chlorfenvinphos, 79-0366
DDT, 79-0132
Trifenmorph, 79-0383
In vitro
Chlorfenvinphos, 79-0366
Trifenmorph, 79-0383

Neonate
see also Reproduction/growth
Animals/experimental
Dioxins, 79-0179
Propoxur, 79-0644

Nervous system
see also Behavior; Brain; Peripheral nerves; Polyneuritis; Sympathetic nerves
General
Arsenicals, 79-0218
Mercurials, 79-0218
Organophosphates, 79-0218
Animals/experimental
DSMA, 79-0455
EPN, 79-0460
Mercurials, 79-0455
Parathion, 79-0460
Tri-*o*-cresyl phosphate, 79-0460 79-0721
Human
Thallium, 79-0091
Tri-*o*-cresyl phosphate, 79-0070 79-0091
Trichlorfon, 79-0071
In vitro
Pyrethrins, 79-0185

Nucleic acids
see also Biochemical effects
Animals/experimental
Cismethrin, 79-0362
DDT, 79-0362
Decamethrin, 79-0362
Dioxins, 79-0177

Pancreas (endocrine)
Animals/experimental
Azinphosmethyl, 79-0674
Human
Vacor, 79-0588

Pancreas (exocrine)
see also Digestive system
Animals/experimental
Nitrofen, 79-0674

Parasympathetic nerves
Animals/experimental
DFP, 79-0417
Soman, 79-0377

Peripheral nerves
see also Nervous system
Human
Bromophos, 79-0602
Lindane, 79-0602
Malathion, 79-0572, 79-0602
Piperonyl butoxide, 79-0602
Pyrethrins, 79-0602
Thiometon, 79-0572

Phagocytes
see also Reticuloendothelial system
Animals/experimental
Dioxins, 79-0612

Photodecomposition
see also Residue degradation 79-0313
Atrazine, 79-0042
Carbaryl, 79-0307
Chlorothalonil, 79-0563
Chlorpropham, 79-0307
DDE, 79-0061
Dichlofluanid, 79-0051
Dioxins, 79-0302, 79-0312
Heptachlor derived compounds 79-0529
Methoxychlor, 79-0022
Parathion, 79-0023, 79-0528
Permethrin, 79-0293
Propham, 79-0307
Trifluralin, 79-0528
Triforine derived compounds 79-0562
Xanthene dyes, 79-0259

Placental transfer
see also Reproduction/growth
Animals/experimental
Phthalide, 79-0102

Plasma/serum
see also Blood/body fluids
Animals/experimental
DDT, 79-0132
Warfarin, 79-0108

Polyneuritis
see also Nervous system
Animals/experimental
EPN, 79-0696
Leptophos, 79-0628, 79-0696 79-0718
Organophosphates, 79-0625 79-0696
Tri-*o*-cresyl phosphate, 79-0696
In vitro
Organophosphates, 79-0625

Porphyrins/pigments
see also Biochemical effects
Animals/experimental
Dioxins, 79-0175
Fenitrothion, 79-0389, 79-0434
Fenthion, 79-0391
Hexachlorobenzene, 79-0101
PCP, 79-0101
Human
Hexachlorobenzene, 79-0584
In vitro

Porphyrins/pigments (cont'd)
Dioxins, 79-0425

Prevention
General, 79-0004
Fenitrothion, 79-0576
Decontamination, 79-0313
Aldrin, 79-0314
Chlordane, 79-0320
Chlordecone, 79-0315
2,4-D, 79-0320
DDT, 79-0314, 79-0320
Dieldrin, 79-0314
Dioxins, 79-0274, 79-0331
Malathion, 79-0315, 79-0320
Monuron, 79-0321
PMA, 79-0315
Polychlorinated biphenyls 79-0314, 79-0315, 79-0321
Toxaphene, 79-0314
Disposal, 79-0316, 79-0318, 79-0583
Aldicarb, 79-0317
Captan, 79-0317
Chlordane, 79-0320
2,4-D, 79-0320
DDT, 79-0320
Hexachlorobenzene, 79-0090
Malathion, 79-0320
Maneb, 79-0317
Methyl parathion, 79-0317
Mirex, 79-0317, 79-0319
Polychlorinated biphenyls 79-0090
Toxaphene, 79-0317
Education/training, 79-0006
Protective equipment
Parathion, 79-0266

Reproduction/growth
see also Androgens; Eggshell effects; Embryo/fetus; Estrogens; Fertility/sterility; Gametogenesis; Growth; Hormones; Neonate; Placental transfer; Reproductive organs, female; Reproductive organs, male
Animals/experimental
DDT, 79-0134
2,4,5-T, 79-0676
Thiram, 79-0141
Human
DBCP, 79-0067
In vitro
DFP, 79-0619
Trichlorfon, 79-0618, 79-0619
Microorganisms
Herbicides, 79-0702

Reproductive organs, female
see also Reproduction/growth
Animals/experimental
Carbaryl, 79-0146
Fenitrothion, 79-0146

Reproductive organs, male
see also Reproduction/growth
Animals/experimental
Dieldrin, 79-0385
Lindane, 79-0387
Parathion, 79-0385, 79-0387
Human
DBCP, 79-0182

Residue degradation
see also Photodecomposition
General
Aldicarb, 79-0317
Captan, 79-0317
Maneb, 79-0317
Methyl parathion, 79-0317
Mirex, 79-0317
Toxaphene, 79-0317
Air
Parathion, 79-0528
Trifluralin, 79-0528
Food and feed
Carbaryl, 79-0031
Carbophenothion, 79-0026 79-0299
2,4-D, 79-0537
Ethion, 79-0026, 79-0299
Ethylene thiourea, 79-0054
Parathion, 79-0026, 79-0299
Zineb, 79-0054
In vitro
Carbamates, 79-0043
Propham, 79-0524
Triforine derived compounds 79-0562
Plants
Pyrazon, 79-0261
Soil
Aldicarb, 79-0561
Aldicarb derived compounds 79-0559, 79-0560
Atrazine, 79-0041
Butralin, 79-0017
Carbofuran, 79-0035, 79-0296
Chlordecone, 79-0118
Chlortoluron, 79-0215
DDE, 79-0276
DDT, 79-0276
Dimethoate, 79-0283
Diuron, 79-0565
Herbicide derived compounds 79-0526
Herbicides, 79-0065, 79-0303 79-0349
Linuron, 79-0535
Methazole, 79-0564, 79-0565
Metribuzin, 79-0041, 79-0268
Meturin, 79-0534
Meturin derived compounds 79-0534
Permethrin, 79-0293
Phorate, 79-0296
Pyrazon, 79-0261
Quintozene, 79-0016, 79-0158
TDE, 79-0276
Toxaphene, 79-0058
Trichlormethyl, 79-0292
Water
Carbaryl, 79-0307
Chlorpropham, 79-0307
Dioxins, 79-0264
Diuron, 79-0747

Residue degradation (cont'd)
Phorate, 79-0037
Propham, 79-0307

Residue dynamics
Butralin, 79-0017
Carbaryl, 79-0308
Carbofuran, 79-0296
2,4-D, 79-0298, 79-0308
Diazinon, 79-0308
Disulfoton, 79-0277
Malathion, 79-0308
Organochlorines, 79-0275
Phorate, 79-0296
Polychlorinated biphenyls, 79-0275
Toxaphene, 79-0058
Trichlormethyl, 79-0292

Residue removal
Food and feed
Endosulfan, 79-0513
Lindane, 79-0513
Water, 79-0582

Residues/air
General, 79-0044, 79-0538
Chlorpyrifos, 79-0269
Greenhouse
Dicofol, 79-0288
Dinobuton, 79-0140, 79-0288
Dinocap, 79-0288
Nicotine, 79-0039
Organophosphates, 79-0039
Phosphamidon, 79-0140
Industrial
Dioxins, 79-0024, 79-0048
Insect hormones, 79-0024 79-0048
Rural
2,4-D, 79-0284, 79-0285
Malathion, 79-0028
Urban
Heptachlor, 79-0265
Polychlorinated biphenyls 79-0265

Residues/food and feed
Animal feed
DDT derived compounds 79-0551
Trichlorfon, 79-0063
Cereals
Pirimiphos-methyl, 79-0521
Coffee beans
Endosulfan, 79-0513
Lindane, 79-0513
Dairy products
BHC, 79-0053
BHC isomers, 79-0046, 79-0545
DDE, 79-0053
DDT, 79-0046, 79-0053, 79-0280 79-0545, 79-0546
Dieldrin, 79-0046, 79-0545 79-0546
Heptachlor epoxide, 79-0046 79-0545, 79-0546
Hexachlorobenzene, 79-0053
Lindane, 79-0546
TDE, 79-0046, 79-0053, 79-0280

Residues/food and feed (cont'd)
Fish
BHC isomers, 79-0545
DDT, 79-0519, 79-0542, 79-0545 79-0557
Dieldrin, 79-0545, 79-0557
Heptachlor epoxide, 79-0545
Hexachlorobenzene, 79-0519
Mercurials, 79-0542, 79-0557
Polychlorinated biphenyls 79-0519, 79-0557
Trichlorfon, 79-0063
Fruits
Azinphosmethyl, 79-0272
Carbamates, 79-0262
Carbaryl, 79-0031
Carbophenothion, 79-0299
2,4-D, 79-0298, 79-0300
Dialifor, 79-0019
Dichlofluanid, 79-0518
Ethion, 79-0299, 79-0301
Fungicides, 79-0030
Herbicides, 79-0030
Malathion, 79-0301
Mancozeb, 79-0270
Methidathion, 79-0301
Metiram, 79-0270
Organochlorines, 79-0030
Organophosphates, 79-0030 79-0262
Parathion, 79-0027, 79-0299
Phosalone, 79-0019
Meat
BHC isomers, 79-0545
DDE, 79-0032
DDT, 79-0032, 79-0545
Dieldrin, 79-0545
Heptachlor, 79-0032
Heptachlor epoxide, 79-0032 79-0545
Hexachlorobenzene, 79-0032
IBP, 79-0211
Lindane, 79-0032
TDE, 79-0032
Poultry
Mercurials, 79-0064
Vegetables
Carbamates, 79-0305
Carbaryl, 79-0263
2,4-D, 79-0537
DCPA, 79-0018
Endosulfan, 79-0279
Ethylene thiourea, 79-0033
Fungicides, 79-0030
Herbicides, 79-0030
Lindane, 79-0305
Mancozeb, 79-0271
Maneb, 79-0271
Monocrotophos, 79-0278
Organochlorines, 79-0030
Organophosphates, 79-0030
Quintozene, 79-0305
Wine
Benomyl, 79-0512
Carbendazim, 79-0512
Thiophanate-methyl, 79-0512

Residues/humans
General
BHC isomers, 79-0544
DDE, 79-0544
DDT, 79-0544
Dieldrin, 79-0544
Parathion, 79-0266
Adipose
BHC isomers, 79-0406, 79-0539 79-0540
Chlordane, 79-0539
DDE, 79-0509, 79-0539
DDT, 79-0015, 79-0509
DDT isomers, 79-0406
Hexachlorobenzene, 79-0015 79-0539
Organochlorines, 79-0294
Polychlorinated biphenyls 79-0015
TDE, 79-0015
Blood
BHC isomers, 79-0406
DDE, 79-0509
DDT, 79-0509
DDT isomers, 79-0406
Milk
DDE, 79-0021, 79-0052
DDT, 79-0015, 79-0021, 79-0052 79-0258, 79-0523
Dieldrin, 79-0523
Hexachlorobenzene, 79-0015
Polychlorinated biphenyls 79-0015, 79-0052, 79-0523
TDE, 79-0015
Organs
BHC isomers, 79-0539, 79-0543
Chlordane, 79-0539
DDE, 79-0539
DDT derived compounds 79-0514, 79-0543
Dieldrin, 79-0514, 79-0543
Hexachlorobenzene, 79-0539
Lindane, 79-0514

Residues/non-target organisms
General
DDT, 79-0571
Dieldrin, 79-0571
Organochlorines, 79-0568
Polychlorinated biphenyls 79-0568, 79-0571
Bats
Mercurials, 79-0517
Birds
DDE, 79-0548, 79-0553, 79-0555
DDT, 79-0553, 79-0554, 79-0555 79-0556
Dieldrin, 79-0553, 79-0554 79-0555, 79-0556
Endrin, 79-0548
Heavy metals, 79-0552
Heptachlor epoxide, 79-0555
Lindane, 79-0556
Mercurials, 79-0556
Mirex, 79-0555
Organochlorines, 79-0552
Polychlorinated biphenyls 79-0548, 79-0552, 79-0554

Residues/non-target organisms (cont'd)
Polychlorinated biphenyls 79-0555
TDE, 79-0555
Chicken
Mercurials, 79-0064
Tetrachlorvinphos, 79-0287
Cow
Toxaphene, 79-0286
Eggs
DDE, 79-0341, 79-0548
DDT, 79-0554
Dieldrin, 79-0341, 79-0554
Endrin, 79-0548
Polychlorinated biphenyls 79-0548, 79-0554
Fish
Chlordane, 79-0577
Chlordecone, 79-0118
DDT, 79-0519, 79-0542, 79-0547
DDT derived compounds 79-0577
Dieldrin, 79-0577
Hexachlorobenzene, 79-0519
Mercurials, 79-0542
Mirex, 79-0558, 79-0577
Polychlorinated biphenyls 79-0519, 79-0577
Molluscs
DDT, 79-0029
Mirex, 79-0558
Plankton/algae
DDE, 79-0290
DDT, 79-0290
Mirex, 79-0558
Polychlorinated biphenyls 79-0290

Residues/plants
Chaparral
2,4-D, 79-0520
2,4,5-T, 79-0520
Forest
Fenitrothion, 79-0025
Marijuana
Paraquat, 79-0533
Medicinals and condiments
Organochlorines, 79-0060
Ornamentals
Chlorpyrifos, 79-0516
Diazinon, 79-0516
Tobacco
Organochlorines, 79-0062
Organophosphates, 79-0062

Residues/soil
General
Carbamates, 79-0038
Chlorpyrifos, 79-0516
2,4-D, 79-0520
DDT derived compounds 79-0551
Diazinon, 79-0516
Dimethoate, 79-0282
Herbicides, 79-0159
Linuron, 79-0310, 79-0535
Meturin, 79-0534

Residues/soil (cont'd)
Meturin derived compounds 79-0534
Monuron derived compounds 79-0522
Napropamide, 79-0511
Organochlorines, 79-0038 79-0568
Organophosphates, 79-0038
Polychlorinated biphenyls 79-0568
Polychloropinene, 79-0289
Simazine, 79-0310, 79-0510
2,4,5-T, 79-0520
Trifluralin, 79-0511, 79-0569
Adsorption
Aldicarb, 79-0059
BHC, 79-0057
2,4-D, 79-0567
Herbicide derived compounds 79-0526
Herbicides, 79-0036
Methoxychlor, 79-0020
Organochlorines, 79-0062
Organophosphates, 79-0055 79-0062
Parathion, 79-0055, 79-0057 79-0304, 79-0527
Picloram, 79-0527
Silvex, 79-0567
2,4,5-T, 79-0567
Movement
Atrazine, 79-0295
Dimethoate, 79-0281
Herbicides, 79-0040
Simazine, 79-0295
Volatilization
Carbamates, 79-0260
DDE, 79-0276
DDT, 79-0045, 79-0276
Dieldrin, 79-0045
Herbicides, 79-0045
Mercurials, 79-0056
Methyl bromide, 79-0291
Metribuzin, 79-0268
Organochlorines, 79-0260
Organophosphates, 79-0260
TDE, 79-0276

Residues/water
General
Carbamates, 79-0306
Carbaryl, 79-0307
Chlorpropham, 79-0307
Propham, 79-0307
Drinking water
DDT, 79-0549
DDT derived compounds 79-0549
Polychlorinated biphenyls 79-0549
Estuaries/marshes
Mirex, 79-0558
Organochlorines, 79-0568
Polychlorinated biphenyls 79-0568
Groundwater/rain, 79-0530
Atrazine, 79-0295

Residues/water (cont'd)
Benthiocarb, 79-0309
Bromacil, 79-0532
CNP, 79-0309
DDT, 79-0550
Herbicides, 79-0050
Simazine, 79-0295
Irrigation water
Diuron, 79-0566
Simazine, 79-0034, 79-0531
Lakes/ponds
2,4-D, 79-0028
Herbicides, 79-0049
Lindane, 79-0028
Mercurials, 79-0267
Organochlorines, 79-0267
Phorate, 79-0037
Polychlorinated biphenyls 79-0267
Sodium arsenite, 79-0273
2,4,5-T, 79-0028
Oceans/seas
DDE, 79-0290
DDT, 79-0290, 79-0571
Dieldrin, 79-0571
Polychlorinated biphenyls 79-0290, 79-0571
Propanil, 79-0525
Paddy water
3,4-Dichloroaniline, 79-0570
Lindane, 79-0570
Molinate, 79-0570
Parathion, 79-0570
Propanil, 79-0570
Rivers/streams
Aldrin, 79-0515
Benthiocarb, 79-0309
CNP, 79-0309
DDT, 79-0515, 79-0549
DDT derived compounds 79-0549
Heptachlor, 79-0515
Lindane, 79-0515
Polychlorinated biphenyls 79-0549
Wastewater
Carbaryl, 79-0308
2,4-D, 79-0308
DDT, 79-0029
Diazinon, 79-0308
Malathion, 79-0308

Respiration, cellular
see also Biochemical effects
General
Tributyltin, 79-0099
Triphenyltin, 79-0099
Animals/experimental
Chlorfenvinphos, 79-0366
2,4-D, 79-0446
Endrin, 79-0116
Fenitrothion, 79-0434
Hexachlorobenzene, 79-0646
In vitro
Chlorfenvinphos, 79-0366
DDE, 79-0638
DDT, 79-0638
Dioxins, 79-0425

Respiration, cellular (cont'd)
Microorganisms
Chlorpyrifos, 79-0117
Chlorthiamid, 79-0216
Dieldrin, 79-0117
Lenacil, 79-0216
Maneb, 79-0117
Methyl isothiocyanate, 79-0117
2,4,5-T, 79-0216
Terbacil, 79-0216

Respiratory system
see also Lung; Upper respiratory tract
Animals/experimental
Polyoxin D, 79-0183
Human, 79-0093

Reticuloendothelial system
see also Marrow; Phagocytes; Spleen
Animals/experimental
Butachlor, 79-0700
Chlorbenzilate, 79-0700
Fenitrothion, 79-0700
MTMC, 79-0700
Thiophanate-methyl, 79-0700

Reviews
General, 79-0251
Herbicide antidotes, 79-0005
Herbicides, 79-0252, 79-0257
Tin compounds, 79-0001
Analysis, 79-0220, 79-0484, 79-0726
Fungicides, 79-0498
Herbicides, 79-0498
Organochlorines, 79-0227
Polychlorinated biphenyls 79-0227
Epidemiology, prevention, and treatment, 79-0316, 79-0318 79-0504
Chlordane, 79-0324
DDT, 79-0324
Diquat, 79-0088
Endrin, 79-0324
Organophosphates, 79-0324
Paraquat, 79-0088
Thallium, 79-0079, 79-0091
Tri-o-cresyl phosphate, 79-0091
Monitoring and residues, 79-0530 79-0688
Arsenic trioxide, 79-0047
Carbamates, 79-0260
DDT, 79-0571
Dieldrin, 79-0571
Epidemiology, prevention, and treatment, 79-0047
Organochlorines, 79-0254 79-0260
Organophosphates, 79-0254 79-0260
Polychlorinated biphenyls 79-0571
Toxicology and pharmacology 79-0688
Carbamates, 79-0723
DDT, 79-0134
Fungicides, 79-0723
Herbicides, 79-0723

Reviews (cont'd)
Organochlorines, 79-0149
79-0254, 79-0722, 79-0723
Organophosphates, 79-0254
79-0723
Thallium, 79-0091
Tin compounds, 79-0097
Tri-*o*-cresyl phosphate, 79-0091

Reye's Syndrome
Human, 79-0076
Fenitrothion, 79-0077
Organochlorines, 79-0075
Organophosphates, 79-0075

Safety standards
General, 79-0007, 79-0330
2,4,5-T, 79-0011
Reentry time
Carbophenothion, 79-0026
79-0299
Ethion, 79-0026, 79-0299
Paraoxon, 79-0447
Parathion, 79-0026, 79-0027
79-0299, 79-0447
TLV/MAC
Atrazine, 79-0092
Carbamates, 79-0092
Dimethoate, 79-0346
Fenitrothion, 79-0346
Fenthion, 79-0668
Organochlorines, 79-0092
Organophosphates, 79-0092
(3α-Phenyl-β-acetylene)-4-
hydroxycoumarin, 79-0395
Phosalone, 79-0346
Temephos, 79-0346
Toxicity rating class
Chlordane, 79-0357
Fenitrothion, 79-0357
Quinalphos, 79-0357
Thiometon, 79-0357
Water standards, 79-0003

Sensory system
see Vision

Skeleton/bone
see also Musculoskeletal system
Animals/experimental
Carbaryl, 79-0198
Chlorfenvinphos, 79-0198
Dicrotophos, 79-0130
Parathion, 79-0217

Skin
see also Integument
Animals/experimental
Maneb, 79-0119
Paraquat, 79-0363
Human, 79-0592
Herbicides, 79-0609
Nitrofen, 79-0334
Organochlorines, 79-0609
Organophosphates, 79-0609

Spectrometry
see also Analysis
General
Carbaryl, 79-0263

Spectrometry (cont'd)
2,4-D, 79-0493
MCPA, 79-0493
MCPB, 79-0493
MCPP, 79-0493
Colorimetry
Dinocap, 79-0736
Fenitrothion, 79-0743
Methyl parathion, 79-0743
Niclosamide, 79-0239
Diffraction
Tin compounds, 79-0219
Fluorometry
Acrolein, 79-0476
Methyl bromide, 79-0748
Infrared, 79-0220
Dichlorvos, 79-0740
Mass spectrometry, 79-0725
Ametryne, 79-0728
Atrazine, 79-0728
Carbamates, 79-0746
Dioxins, 79-0224, 79-0241
Nitro compounds, 79-0746
Organochlorines, 79-0735
79-0746
Organophosphates, 79-0746
PCP, 79-0491
Prometryne, 79-0728
Propazine, 79-0728
2,4,5-T, 79-0224
Thallium, 79-0467
Trifluralin, 79-0728
NMR
Acrolein, 79-0476
Tin compounds, 79-0219
Radiometry, 79-0232, 79-0242
Raman, 79-0739
UV
Malathion, 79-0729
Tin compounds, 79-0219

Spleen
see also Reticuloendothelial system
Animals/experimental
Dioxins, 79-0180
Hexachlorobenzene, 79-0170
In vitro
Dioxins, 79-0181
Hexachlorobenzene, 79-0170

Sympathetic nerves
see also Nervous system
Animals/experimental
Carbaryl, 79-0655
Paraoxon, 79-0624

Therapeutic use
Cancer
Dioxins, 79-0177
TDE, 79-0100, 79-0204
Cushing's syndrome
TDE, 79-0352
Pediculosis
Malathion, 79-0440
Scabies
Phosmet, 79-0419

Thermal decomposition
see Residue degradation

Thyroid
Animals/experimental
Dichlorvos, 79-0208
Ethylene thiourea, 79-0649
Zineb, 79-0213
Animals/non-target
Chlordane, 79-0577
DDT derived compounds
79-0577
Dieldrin, 79-0577
Mirex, 79-0577
Polychlorinated biphenyls
79-0577

Titration
see also Analysis
Oxamyl, 79-0223

Toxicity/experimental animals
General
Dioxins, 79-0209
Fenitrothion, 79-0436
Fenitrothion derivatives, 79-0436
2,4,5-T, 79-0209
Amphibians
Aldrin, 79-0201
Maneb, 79-0119
Pyrethrins, 79-0166
Bee
Atrazine, 79-0386
Carbamates, 79-0386
Diazinon, 79-0386, 79-0421
Parathion, 79-0386
Phosalone, 79-0421
Tetrachlorvinphos, 79-0421
Trichlorfon, 79-0421
Birds
Pyrethrum, 79-0448
Chicken
Captan, 79-0113
Carboxin, 79-0210
2,4-D, 79-0370
DAEP, 79-0375
DDE, 79-0358
DDT, 79-0358
Folpet, 79-0113
Leptophos, 79-0718
Picloram, 79-0370
Ronnel, 79-0365
2,4,5-T, 79-0370
Cow
PCP, 79-0420
Crustacea
BHC isomers, 79-0464
Methyl parathion, 79-0720
PCP, 79-0120
Dog
Fenitrothion, 79-0697
Polyoxin B, 79-0690
Duck
DDE, 79-0358
DDT, 79-0358
Eggs
2,4-D, 79-0370
Picloram, 79-0370
2,4,5-T, 79-0370
Fish
BHC isomers, 79-0464

Toxicity/experimental animals (cont'd)
Carbamates, 79-0723
Chlordane, 79-0357
Clonitralide, 79-0160
Endosulfan, 79-0096
Endrin, 79-0096
Fenitrothion, 79-0357
Fungicides, 79-0723
Herbicides, 79-0723
Insect hormones, 79-0114
Leptophos, 79-0096
Malathion, 79-0096
Methyl parathion, 79-0720
Organochlorines, 79-0723
Organophosphates, 79-0723
Pyrethrins, 79-0166
Quinalphos, 79-0357
Thiometon, 79-0357
Guinea pig
Fenthion, 79-0668
Insect hormones, 79-0171
Insects
Organophosphates, 79-0413
Microorganisms
Atrazine, 79-0376
2,4-D, 79-0711
Fungicides, 79-0202
Herbicides, 79-0202
Molluscs
DDT, 79-0381
Parathion, 79-0381
Monkey
Chlorpyrifos, 79-0698
Fenitrothion, 79-0697
Hexachlorobenzene, 79-0152
Insect hormones, 79-0171
Leptophos, 79-0694
PCP, 79-0152
Mouse
DFP, 79-0104
Ethylene dibromide, 79-0717
Fenitrothion, 79-0398
Fenthion, 79-0668
Insect hormones, 79-0171
Organophosphates, 79-0413
79-0699
Ovex, 79-0682
o-Phenylphenol, 79-0701
Polyoxin B, 79-0690
Polyoxin D, 79-0692
Trichlorfon, 79-0103
Trifluralin, 79-0640
Plankton/algae
BHC, 79-0681
BHC isomers, 79-0464
Carbofuran, 79-0650
2,4-D, 79-0681
Hexachlorobenzene, 79-0646
PCP, 79-0423
Plants
Chlorbromuron, 79-0164
Metobromuron, 79-0164
Quail
DDE, 79-0122
DDT, 79-0122
DDT derived compounds
79-0122

Toxicity/experimental animals (cont'd)
Warfarin, 79-0108
Rabbit
Chlordane, 79-0163
Dieldrin, 79-0397
Oxychlordane, 79-0163
Paraquat, 79-0110, 79-0656
Parathion, 79-0390
Polyoxin B, 79-0690
Ronnel, 79-0365
Warfarin, 79-0212
Rat
Carbaryl, 79-0199
Carbofuran, 79-0401
Carbon tetrachloride, 79-0441
Chlordecone, 79-0441
Dichlorvos, 79-0368
Dieldrin, 79-0397
Dioxins, 79-0378
Ethylene dibromide, 79-0717
Fenitrothion, 79-0694
Fenthion, 79-0391, 79-0668
Hexachlorobenzene, 79-0152
Lindane, 79-0387
Mirex, 79-0384
Parathion, 79-0387
PCP, 79-0152, 79-0420
(3α-Phenyl-β-acetylene)-4-hydroxycoumarin, 79-0395
Polyoxin D, 79-0691
Propoxur, 79-0200, 79-0644
Trichlorfon, 79-0368
Warfarin, 79-0108, 79-0212
Water buffalo
Methyl demeton, 79-0409

Toxicity/humans
General, 79-0076, 79-0591
DBCP, 79-0081
Dioxins, 79-0081
Malathion, 79-0322, 79-0323
79-0440
Organochlorines, 79-0075
Organophosphates, 79-0075
79-0344
Paraquat, 79-0587
Polychlorinated biphenyls
79-0081
Accidental
Calcium phosphate, 79-0598
Calcium polysulfide, 79-0598
Fenitrothion, 79-0508
Hexachlorobenzene, 79-0584
Nitrofen, 79-0334
Organophosphates, 79-0603
Paraquat, 79-0533, 79-0604
Sodium chlorate, 79-0600
Thallium, 79-0078, 79-0086
79-0585
Tri-*o*-cresyl phosphate, 79-0070
Experimental
Paraoxon, 79-0680
Intentional
Dicrotophos, 79-0573
Diquat, 79-0599
Malathion, 79-0572, 79-0610
Methomyl, 79-0610
Paraquat, 79-0072, 79-0343

Toxicity/humans (cont'd)
Parathion, 79-0610
Thallium, 79-0086
Thiometon, 79-0572, 79-0610
Trichlorfon, 79-0071
Occupational, 79-0080, 79-0093
79-0094, 79-0327, 79-0342
79-0589, 79-0590, 79-0592
79-0593, 79-0594, 79-0595
79-0596, 79-0611
Bromophos, 79-0602
Chlorpyrifos, 79-0573
DBCP, 79-0067, 79-0182
Dialifor, 79-0601, 79-0608
Dimethoate, 79-0601, 79-0608
DNOC, 79-0345
Lindane, 79-0602
Malathion, 79-0573, 79-0602
Methomyl, 79-0601, 79-0608
Nitrofen, 79-0334
Organophosphates, 79-0574
Paraquat, 79-0084, 79-0325
Parathion, 79-0266, 79-0573
Phosalone, 79-0601, 79-0608
Piperonyl butoxide, 79-0602
Propargite, 79-0601, 79-0608
Pyrethrins, 79-0602
Ronnel, 79-0573

Toxicity/non-target organisms
General
Acephate, 79-0328
Carbamates, 79-0338
Carbaryl, 79-0328
Diflubenzuron, 79-0328
Dioxins, 79-0331
Organochlorines, 79-0338
Organophosphates, 79-0338
Birds
DDE, 79-0341
Dieldrin, 79-0341
Monocrotophos, 79-0326
Cat
Heavy metals, 79-0336
PCP, 79-0606
Rodenticides, 79-0336
Cow
Toxaphene, 79-0286
Crustacea
Aldrin, 79-0579
Chlorpyrifos, 79-0339
Dieldrin, 79-0579
Temephos, 79-0339
Dog
Heavy metals, 79-0336
Paraquat, 79-0335
Rodenticides, 79-0336
Fish
Organochlorines, 79-0275
Polychlorinated biphenyls
79-0275
Fungi
Azinphosmethyl, 79-0074
Zineb, 79-0074
Helminths
Organochlorines, 79-0465
Human
Dialifor, 79-0019

Toxicity/non-target organisms (cont'd)
Phosalone, 79-0019
Invertebrates
Carbamates, 79-0354
Fungicides, 79-0354
Herbicides, 79-0354
Microorganisms
Azinphosmethyl, 79-0074
Chlorpyrifos, 79-0117
Dieldrin, 79-0117
Herbicides, 79-0347
Maneb, 79-0117
Methyl isothiocyanate, 79-0117
Simazine, 79-0311
Zineb, 79-0074
Molluscs
Chlorpyrifos, 79-0586
Temephos, 79-0586
Small mammals
Rodenticides, 79-0337

Treatment of poisoning
General
Paraoxon, 79-0106
Atropine
Malathion, 79-0440
Dialysis
Thallium, 79-0078
Hemoperfusion
Paraquat, 79-0340
HS-6
Soman, 79-0377
Oximes
Carbaryl, 79-0450
Dichlorvos, 79-0373, 79-0374
Organophosphates, 79-0450

Upper respiratory tract
see also Respiratory system
Human, 79-0094

Vision
Animals/experimental
Carbaryl, 79-0655
Fenitrothion, 79-0389
Fenthion, 79-0391
Parathion, 79-0390
Human
Organophosphates, 79-0332
79-0333

Vitamins/coenzymes
see also Biochemical effects
Animals/experimental
BHC, 79-0703
Carbaryl, 79-0198
Chlorfenvinphos, 79-0198
DDT, 79-0703
Fungicides, 79-0719
Heavy metals, 79-0449
Polychlorinated biphenyls
79-0703
Warfarin, 79-0206
Zineb, 79-0449

Subject Index: Compounds

Acephate
see also Organophosphates
Toxicity/non-target organisms
General, 79-0328

Acrolein
see also Herbicides
Bioassay, 79-0476
Electrometry
Polarography, 79-0476
Spectrometry
Fluorometry, 79-0476
NMR, 79-0476

Aldicarb
see also Carbamates
Prevention
Disposal, 79-0317
Residue degradation
General, 79-0317
Soil, 79-0561
Residues/soil
Adsorption, 79-0059

Aldicarb derived compounds
Residue degradation
Soil, 79-0559, 79-0560

Aldrin
see also Organochlorines
Absorption
Rabbit, 79-0380
Distribution/storage
Rabbit, 79-0380
Enzyme activity
ATPase, 79-0714
Prevention
Decontamination, 79-0314
Residues/water
Rivers/streams, 79-0515
Toxicity/experimental animals
Amphibians, 79-0201
Toxicity/non-target organisms
Crustacea, 79-0579

Allethrin
see also Pyrethrins
Experimental design
Toxicology and pharmacology
79-0412
Immunology
Animals/experimental, 79-0412

Ametryne
see also Herbicides
Chromatography
Gas-liquid, 79-0728
Immunology
Animals/experimental, 79-0372
Spectrometry
Mass spectrometry, 79-0728

Amitrole
Absorption
Rabbit, 79-0707
Distribution/storage
Rabbit, 79-0707

Amitrole (cont'd)
Enzyme activity
Catalases, 79-0673
Factors influencing metabolism/
toxicity
Taxon, 79-0673

Armine
see also Organophosphates
Enzyme activity
Cholinesterase, 79-0651, 79-0672
Factors influencing metabolism/
toxicity
Interactions, 79-0651, 79-0672

Aroclor 1254
see Polychlorinated biphenyls

Arsenic trioxide
see also Arsenicals
Reviews
Monitoring and residues, 79-0047

Arsenicals
see also Arsenic trioxide; Sodium
arsenite
Carcinogenesis
Human, 79-0575
Nervous system
General, 79-0218

Asulam
see also Herbicides
Metabolism
Microorganisms, 79-0161

Atrazine
see also Herbicides
Chromatography
Gas-liquid, 79-0728
Factors influencing metabolism/
toxicity
Interactions, 79-0386
Photodecomposition, 79-0042
Residue degradation
Soil, 79-0041
Residues/soil
Movement, 79-0295
Residues/water
Groundwater/rain, 79-0295
Safety standards
TLV/MAC, 79-0092
Spectrometry
Mass spectrometry, 79-0728
Toxicity/experimental animals
Bee, 79-0386
Microorganisms, 79-0376

Azinphosmethyl
see also Organophosphates
Carcinogenesis
Animals/experimental, 79-0674
Pancreas (endocrine)
Animals/experimental, 79-0674
Residues/food and feed
Fruits, 79-0272
Toxicity/non-target organisms

Azinphosmethyl (cont'd)
Fungi, 79-0074
Microorganisms, 79-0074

Azobenzene
Chromatography
Gas-liquid, 79-0471

Bayer 73
see Clonitralid

Benomyl
see also Fungicides
Residues/food and feed
Wine, 79-0512

Benthiocarb
see also Carbamates
Experimental design
Monitoring and residues, 79-0309
Residues/water
Groundwater/rain, 79-0309
Rivers/streams, 79-0309

BHC
see also Organochlorines
Carbohydrates
Animals/experimental, 79-0205
Chromatography
Gas-liquid, 79-0482
HPL, 79-0482
Enzyme activity
Acid phosphatase, 79-0404
Alkaline phosphatase, 79-0404
GPT, 79-0205
Factors influencing metabolism/
toxicity
Nutritional state, 79-0703
Sex, 79-0404
Growth
Animals/experimental, 79-0205
Kidney
Animals/experimental, 79-0205
Laws and regulations
Japan, 79-0255
Lipids/steroids/sterols
Animals/experimental, 79-0703
Liver
Animals/experimental, 79-0205
Mutagenesis/teratogenesis
Animals/experimental, 79-0681
Residues/food and feed
Dairy products, 79-0053
Residues/soil
Adsorption, 79-0057
Toxicity/experimental animals
Plankton/algae, 79-0681
Vitamins/coenzymes
Animals/experimental, 79-0703

BHC isomers
see also Organochlorines
Biotransformation
Human, 79-0406
Brain
Animals/experimental, 79-0715
Carcinogenesis

BHC isomers (cont'd)
Animals/experimental, 79-0137
Chromatography
Gas-liquid, 79-0482, 79-0492
HPL, 79-0482
Endoplasmic reticulum
Animals/experimental, 79-0137
Enzyme activity
General, 79-0407
Excretion
Cow, 79-0167
Factors influencing metabolism/toxicity
Disease state, 79-0137
Interactions, 79-0137, 79-0664 79-0715
Liver
Animals/experimental, 79-0664
Microsomes
Animals/experimental, 79-0137
Residues/food and feed
Dairy products, 79-0046, 79-0545
Fish, 79-0545
Meat, 79-0545
Residues/humans
General, 79-0544
Adipose, 79-0406, 79-0539 79-0540
Blood, 79-0406
Organs, 79-0539, 79-0543
Toxicity/experimental animals
Crustacea, 79-0464
Fish, 79-0464
Plankton/algae, 79-0464

Biphenyl
see also Fungicides
Amino acids/peptides/proteins
Animals/experimental, 79-0129
Analysis
Sample preparation, 79-0222
Chromatography
Gas-liquid, 79-0222
Enzyme activity
Cytochrome P-450, 79-0129
Mixed function oxidases, 79-0129
Factors influencing metabolism/toxicity
Taxon, 79-0173
Lipids/steroids/sterols
Animals/experimental, 79-0129

Bromacil
see also Herbicides
Residues/water
Groundwater/rain, 79-0532

Bromophos
Peripheral nerves
Human, 79-0602
Toxicity/humans
Occupational, 79-0602

Bromoxynil octanoate
see also Herbicides
Chromatography
Gas-liquid, 79-0494

Butachlor
Reticuloendothelial system
Animals/experimental, 79-0700

Butralin
see also Herbicides
Residue degradation
Soil, 79-0017
Residue dynamics, 79-0017

Buturon
see also Herbicides
Absorption
Rabbit, 79-0380
Distribution/storage
Rabbit, 79-0380
Metabolism
Rat, 79-0393

Calcium cyanimide
Immunology
Animals/experimental, 79-0581
Human, 79-0581

Calcium phosphate
Toxicity/humans
Accidental, 79-0598

Calcium polysulfide
Toxicity/humans
Accidental, 79-0598

Captafol
see also Fungicides
Experimental design
Toxicology and pharmacology 79-0426

Captan
see also Fungicides
Chromosomes/genes
Animals/experimental, 79-0168
Embryo/fetus
Animals/experimental, 79-0113
Marrow
Animals/experimental, 79-0168
Mutagenesis/teratogenesis
Animals/experimental, 79-0113 79-0430
In vitro, 79-0430
Prevention
Disposal, 79-0317
Residue degradation
General, 79-0317
Toxicity/experimental animals
Chicken, 79-0113

Carbamates
see also Aldicarb; Benthiocarb; Carbaryl; Carbofuran; Methomyl; Oxamyl; Pirimicarb; Propoxur
Analysis
Sample preparation, 79-0487
Biotransformation
Plants, 79-0433
Soil, 79-0433
Chromatography
Gas-liquid, 79-0746
Thin-layer, 79-0746
Enzyme activity
Mixed function oxidases, 79-0437
Experimental design
Analysis, 79-0487
Factors influencing metabolism/toxicity
Interactions, 79-0386
Growth
Microorganisms, 79-0095
Metabolism
In vitro, 79-0437
Mutagenesis/teratogenesis
Microorganisms, 79-0730
Residue degradation
In vitro, 79-0043
Residues/food and feed
Fruits, 79-0262
Vegetables, 79-0305
Residues/soil
General, 79-0038
Volatilization, 79-0260
Residues/water
General, 79-0306
Reviews
Monitoring and residues, 79-0260
Toxicology and pharmacology 79-0723
Safety standards
TLV/MAC, 79-0092
Spectrometry
Mass spectrometry, 79-0746
Toxicity/experimental animals
Bee, 79-0386
Fish, 79-0723
Toxicity/non-target organisms
General, 79-0338
Invertebrates, 79-0354

Carbaryl
see also Carbamates
Absorption
Rabbit, 79-0707
Alimentary tract
Animals/experimental, 79-0111
Analysis
Sample preparation, 79-0475
Biochemical effects
Animals/experimental, 79-0199
Chromatography
Thin-layer, 79-0475
Distribution/storage
Rabbit, 79-0707
Electrolytes
Animals/experimental, 79-0198
Enzyme activity
General, 79-0111
Cholinesterase, 79-0450
Experimental design
Monitoring and residues, 79-0475
Factors influencing metabolism/toxicity
Nutritional state, 79-0198
Gametogenesis
Animals/experimental, 79-0146
Immunology
Animals/experimental, 79-0372
Lipids/steroids/sterols
Animals/experimental, 79-0198
Photodecomposition, 79-0307
Reproductive organs, female

Carbaryl (cont'd)
Animals/experimental, 79-0146
Residue degradation
Food and feed, 79-0031
Water, 79-0307
Residue dynamics, 79-0308
Residues/food and feed
Fruits, 79-0031
Vegetables, 79-0263
Residues/water
General, 79-0307
Wastewater, 79-0308
Skeleton/bone
Animals/experimental, 79-0198
Spectrometry
General, 79-0263
Sympathetic nerves
Animals/experimental, 79-0655
Toxicity/experimental animals
Rat, 79-0199
Toxicity/non-target organisms
General, 79-0328
Treatment of poisoning
Oximes, 79-0450
Vision
Animals/experimental, 79-0655
Vitamins/coenzymes
Animals/experimental, 79-0198

Carbendazim
see also Fungicides
Biochemical effects
Microorganisms, 79-0194
Residues/food and feed
Wine, 79-0512

Carbofuran
see also Carbamates
Enzyme activity
ATPase, 79-0401
Cholinesterase, 79-0401
Residue degradation
Soil, 79-0035, 79-0296
Residue dynamics, 79-0296
Toxicity/experimental animals
Plankton/algae, 79-0650
Rat, 79-0401

Carbon disulfide
Enzyme activity
Cytochrome P-450, 79-0192
Microsomes
General, 79-0192

Carbon tetrachloride
Endoplasmic reticulum
Animals/experimental, 79-0458
Enzyme activity
Cytochrome P-450, 79-0192
Factors influencing metabolism/toxicity
Disease state, 79-0127
Interactions, 79-0127, 79-0441 79-0458
Liver
Animals/experimental, 79-0127 79-0458
Microsomes
General, 79-0192

Carbon tetrachloride (cont'd)
Toxicity/experimental animals
Rat, 79-0441

Carbophenothion
see also Organophosphates
Factors influencing metabolism/toxicity
General, 79-0299
Residue degradation
Food and feed, 79-0026, 79-0299
Residues/food and feed
Fruits, 79-0299
Safety standards
Reentry time, 79-0026, 79-0299

Carboxin
see also Fungicides
Chromatography
Gas-liquid, 79-0477
Toxicity/experimental animals
Chicken, 79-0210

Chloramben
Biotransformation
Plants, 79-0670

Chlorbenzilate
Reticuloendothelial system
Animals/experimental, 79-0700

Chlorbromuron
see also Herbicides
Biotransformation
Microorganisms, 79-0351
Metabolism
Plants, 79-0164
Toxicity/experimental animals
Plants, 79-0164

Chlordane
see also Organochlorines
Bioassay, 79-0357
Blood cells
Human, 79-0578
Chromatography
Column, 79-0737
Factors influencing metabolism/toxicity
Disease state, 79-0127
Interactions, 79-0127
Liver
Animals/experimental, 79-0127
Metabolism
In vitro, 79-0188
Rabbit, 79-0163
Prevention
Decontamination, 79-0320
Disposal, 79-0320
Residues/humans
Adipose, 79-0539
Organs, 79-0539
Residues/non-target organisms
Fish, 79-0577
Reviews
Epidemiology, prevention, and treatment, 79-0324
Safety standards
Toxicity rating class, 79-0357
Thyroid

Chlordane (cont'd)
Animals/non-target, 79-0577
Toxicity/experimental animals
Fish, 79-0357
Rabbit, 79-0163

Chlordecone
see also Organochlorines
Biotransformation
Fish, 79-0118
Brain
In vitro, 79-0444, 79-0708
Catecholamines
In vitro, 79-0444
Distribution/storage
General, 79-0172
Factors influencing metabolism/toxicity
Interactions, 79-0441
Fertility/sterility
Animals/experimental, 79-0382
Metabolism
General, 79-0172
Mitochondria
In vitro, 79-0444
Prevention
Decontamination, 79-0315
Residue degradation
Soil, 79-0118
Residues/non-target organisms
Fish, 79-0118
Toxicity/experimental animals
Rat, 79-0441

Chlordimeform
see also Fungicides
Biotransformation
Rat, 79-0659
Electrometry
Polarography, 79-0727
Enzyme activity
Monoamine oxidase, 79-0659
Immunology
Animals/experimental, 79-0372

Chlorfenvinphos
see also Organophosphates
Alimentary tract
Animals/experimental, 79-0111
Carbohydrates
Animals/experimental, 79-0635
Electrolytes
Animals/experimental, 79-0198
Enzyme activity
General, 79-0111, 79-0367
Factors influencing metabolism/toxicity
Nutritional state, 79-0198
Schedule of dosage, 79-0367
Immunology
Animals/experimental, 79-0635
Lipids/steroids/sterols
Animals/experimental, 79-0198
Myocardium
Animals/experimental, 79-0366
In vitro, 79-0366
Respiration, cellular
Animals/experimental, 79-0366
In vitro, 79-0366

Chlorfenvinphos (cont'd)
Skeleton/bone
Animals/experimental, 79-0198
Vitamins/coenzymes
Animals/experimental, 79-0198

Chlormequat chloride
see also Herbicides
Factors influencing metabolism/toxicity
Interactions, 79-0616, 79-0617

3-Chloro-*p*-toluidine
Distribution/storage
Mouse, 79-0713

4-Chloroaniline
see also Herbicide derived compounds
Absorption
Rabbit, 79-0380
Distribution/storage
Rabbit, 79-0380

Chlorothalonil
see also Herbicides
Immunology
Human, 79-0597
Photodecomposition, 79-0563

Chlorpropham
see also Herbicides
Fibroblasts
In vitro, 79-0660
Mitosis/meiosis
In vitro, 79-0660
Photodecomposition, 79-0307
Residue degradation
Water, 79-0307
Residues/water
General, 79-0307

Chlorpyrifos
see also Organophosphates
Absorption
Cow, 79-0416
Rat, 79-0698
Biotransformation
Human, 79-0573
Chromatography
Gas-liquid, 79-0471
Distribution/storage
Cow, 79-0416
Rat, 79-0698
Experimental design
Monitoring and residues, 79-0269
Glands
Animals/experimental, 79-0704
Growth
Microorganisms, 79-0117
Residues/air
General, 79-0269
Residues/plants
Ornamentals, 79-0516
Residues/soil
General, 79-0516
Respiration, cellular
Microorganisms, 79-0117
Toxicity/experimental animals
Monkey, 79-0698

Chlorpyrifos (cont'd)
Toxicity/humans
Occupational, 79-0573
Toxicity/non-target organisms
Crustacea, 79-0339
Microorganisms, 79-0117
Molluscs, 79-0586

Chlorthiamid
see also Herbicides
Respiration, cellular
Microorganisms, 79-0216

Chlortoluron
see also Herbicides
Residue degradation
Soil, 79-0215

Cismethrin
see also Pyrethrins
Brain
Animals/experimental, 79-0362
Nucleic acids
Animals/experimental, 79-0362

Clonitralid
Spectrometry
Colorimetry, 79-0239

Clonitralide
Metabolism
Fish, 79-0160
Toxicity/experimental animals
Fish, 79-0160

CNP
see also Herbicides
Experimental design
Monitoring and residues, 79-0309
Residues/water
Groundwater/rain, 79-0309
Rivers/streams, 79-0309

Cyanophos
Immunology
Human, 79-0597

Cycloate
see also Herbicides
Absorption
Rat, 79-0667
Biotransformation
Rat, 79-0667
Distribution/storage
Rat, 79-0667
Enzyme activity
General, 79-0142
Metabolism
Rat, 79-0142, 79-0394

Cycloheximide
see also Fungicides
Endoplasmic reticulum
Animals/experimental, 79-0458
Factors influencing metabolism/toxicity
Interactions, 79-0458
Liver
Animals/experimental, 79-0458

Cypermethrin
see also Pyrethrins
Excretion
Mouse, 79-0466

2,4-D
see also Herbicides
Analysis
Sample preparation, 79-0742
Biotransformation
In vitro, 79-0150
Plants, 79-0150
Chromatography
Gas-liquid, 79-0245, 79-0472
HPL, 79-0472, 79-0490
Embryo/fetus
Animals/experimental, 79-0446
Excretion
In vitro, 79-0461
Rat, 79-0679
Experimental design
Analysis, 79-0472
Factors influencing metabolism/toxicity
Interactions, 79-0617
Kidney
In vitro, 79-0461
Metabolism
In vitro, 79-0150
Microorganisms, 79-0162
Plants, 79-0150
Mutagenesis/teratogenesis
Animals/experimental, 79-0370
79-0681
Human, 79-0082
Prevention
Decontamination, 79-0320
Disposal, 79-0320
Residue degradation
Food and feed, 79-0537
Residue dynamics, 79-0298, 79-0308
Residues/air
Rural, 79-0284, 79-0285
Residues/food and feed
Fruits, 79-0298, 79-0300
Vegetables, 79-0537
Residues/plants
Chaparral, 79-0520
Residues/soil
General, 79-0520
Adsorption, 79-0567
Residues/water
Lakes/ponds, 79-0028
Wastewater, 79-0308
Respiration, cellular
Animals/experimental, 79-0446
Spectrometry
General, 79-0493
Toxicity/experimental animals
Chicken, 79-0370
Eggs, 79-0370
Microorganisms, 79-0711
Plankton/algae, 79-0681

DAEP
see also Organophosphates
Biochemical effects
Animals/experimental, 79-0375

DAEP (cont'd)
Enzyme activity
ATPase, 79-0375
Cholinesterase, 79-0375
Toxicity/experimental animals
Chicken, 79-0375

DBCP
Carcinogenesis
Human, 79-0182
Gametogenesis
Human, 79-0580
Morbidity and mortality statistics
USA-California, 79-0067
Mutagenesis/teratogenesis
Human, 79-0182
Reproduction/growth
Human, 79-0067
Reproductive organs, male
Human, 79-0182
Toxicity/humans
General, 79-0081
Occupational, 79-0067, 79-0182

DCPA
see also Herbicides
Residues/food and feed
Vegetables, 79-0018

DDE
see also Organochlorines
Adrenal
In vitro, 79-0410
Amino acids/peptides/proteins
Animals/experimental, 79-0122
In vitro, 79-0712
Eggshell effects
Animals/experimental, 79-0358
Enzyme activity
Cytochrome P-450, 79-0122
GPT, 79-0122
Experimental design
Toxicology and pharmacology 79-0424
Factors influencing metabolism/ toxicity
Taxon, 79-0638
Lipids/steroids/sterols
Animals/experimental, 79-0122
In vitro, 79-0410, 79-0712
Liver
Animals/experimental, 79-0122
Microsomes
Animals/experimental, 79-0122
Mitochondria
In vitro, 79-0638
Photodecomposition, 79-0061
Residue degradation
Soil, 79-0276
Residues/food and feed
Dairy products, 79-0053
Meat, 79-0032
Residues/humans
General, 79-0544
Adipose, 79-0509, 79-0539
Blood, 79-0509
Milk, 79-0021, 79-0052
Organs, 79-0539
Residues/non-target organisms

DDE (cont'd)
Birds, 79-0548, 79-0553, 79-0555
Eggs, 79-0341, 79-0548
Plankton/algae, 79-0290
Residues/soil
Volatilization, 79-0276
Residues/water
Oceans/seas, 79-0290
Respiration, cellular
In vitro, 79-0638
Toxicity/experimental animals
Chicken, 79-0358
Duck, 79-0358
Quail, 79-0122
Toxicity/non-target organisms
Birds, 79-0341

DDT
see also Organochlorines
Absorption
Rabbit, 79-0707
Alimentary tract
Animals/experimental, 79-0614
Amino acids/peptides/proteins
Animals/experimental, 79-0122 79-0369
In vitro, 79-0712
Analysis
General, 79-0705
Biochemical effects
Animals/experimental, 79-0405
Biotransformation
In vitro, 79-0705
Blood cells
Human, 79-0578
Brain
Animals/experimental, 79-0132 79-0362
Carbohydrates
Animals/experimental, 79-0614
Chromatography
Gas-liquid, 79-0726
Distribution/storage
Rabbit, 79-0707
Eggshell effects
Animals/experimental, 79-0358 79-0684
Animals/non-target, 79-0554
Electrolytes
Animals/experimental, 79-0136 79-0193
Enzyme activity
Aldehyde dehydrogenase, 79-0631
Aryl hydrocarbon hydroxylase 79-0193, 79-0629
ATPase, 79-0135
Cytochrome P-450, 79-0122
GPT, 79-0122
Mixed function oxidases, 79-0356 79-0396, 79-0642
Monoamine oxidase, 79-0112
Factors influencing metabolism/ toxicity
General, 79-0547
Disease state, 79-0126
Formulation, 79-0126
Interactions, 79-0126, 79-0616
Nutritional state, 79-0136

DDT (cont'd)
Nutritional state, 79-0541 79-0703
Taxon, 79-0638, 79-0642
Immunology
Animals/experimental, 79-0372
Laws and regulations
Japan, 79-0255
Lipids/steroids/sterols
Animals/experimental, 79-0122 79-0132, 79-0703
In vitro, 79-0712
Liver
Animals/experimental, 79-0122 79-0132, 79-0396
Metabolism
Annelids, 79-0647
Plankton/algae, 79-0369
Microsomes
Animals/experimental, 79-0122
Mitochondria
Animals/experimental, 79-0112 79-0381
In vitro, 79-0638
Muscle, smooth
Animals/experimental, 79-0381
Muscle, striated
Animals/experimental, 79-0689
Myocardium
Animals/experimental, 79-0132
Nucleic acids
Animals/experimental, 79-0362
Plasma/serum
Animals/experimental, 79-0132
Prevention
Decontamination, 79-0314 79-0320
Disposal, 79-0320
Reproduction/growth
Animals/experimental, 79-0134
Residue degradation
Soil, 79-0276
Residues/food and feed
Dairy products, 79-0046, 79-0053 79-0280, 79-0545, 79-0546
Fish, 79-0519, 79-0542, 79-0545 79-0557
Meat, 79-0032, 79-0545
Residues/humans
General, 79-0544
Adipose, 79-0015, 79-0509
Blood, 79-0509
Milk, 79-0015, 79-0021, 79-0052 79-0258, 79-0523
Residues/non-target organisms
General, 79-0571
Birds, 79-0553, 79-0554, 79-0555 79-0556
Eggs, 79-0554
Fish, 79-0519, 79-0542, 79-0547
Molluscs, 79-0029
Plankton/algae, 79-0290
Residues/soil
Volatilization, 79-0045, 79-0276
Residues/water
Drinking water, 79-0549
Groundwater/rain, 79-0550

DDT (cont'd)
Oceans/seas, 79-0290, 79-0571
Rivers/streams, 79-0515, 79-0549
Wastewater, 79-0029
Respiration, cellular
In vitro, 79-0638
Reviews
Epidemiology, prevention, and treatment, 79-0324
Monitoring and residues, 79-0571
Toxicology and pharmacology 79-0134
Toxicity/experimental animals
Chicken, 79-0358
Duck, 79-0358
Molluscs, 79-0381
Quail, 79-0122
Vitamins/coenzymes
Animals/experimental, 79-0703

DDT derived compounds
see also Organochlorines
Amino acids/peptides/proteins
Animals/experimental, 79-0122
Carcinogenesis
Human, 79-0514
Enzyme activity
Cytochrome P-450, 79-0122
GPT, 79-0122
Lipids/steroids/sterols
Animals/experimental, 79-0122
Liver
Animals/experimental, 79-0122
Microsomes
Animals/experimental, 79-0122
Residues/food and feed
Animal feed, 79-0551
Residues/humans
Organs, 79-0514, 79-0543
Residues/non-target organisms
Fish, 79-0577
Residues/soil
General, 79-0551
Residues/water
Drinking water, 79-0549
Rivers/streams, 79-0549
Thyroid
Animals/non-target, 79-0577
Toxicity/experimental animals
Quail, 79-0122

DDT isomers
Biotransformation
Human, 79-0406
Residues/humans
Adipose, 79-0406
Blood, 79-0406

Decamethrin
see also Pyrethrins
Analysis
Sample preparation, 79-0500
Brain
Animals/experimental, 79-0362
Chromatography
General, 79-0500
Nucleic acids
Animals/experimental, 79-0362

DEDTC
Endoplasmic reticulum
Animals/experimental, 79-0458
Factors influencing metabolism/toxicity
Interactions, 79-0458
Liver
Animals/experimental, 79-0458

DEF
Enzyme activity
Aliesterase, 79-0452

Demeton-O-methyl
Chromosomes/genes
Plants, 79-0666
Factors influencing metabolism/toxicity
Interactions, 79-0666
Mutagenesis/teratogenesis
Plants, 79-0666

DFP
see also Organophosphates
Blood cells
In vitro, 79-0104
Enzyme activity
Cholinesterase, 79-0104, 79-0677
Tryptophan pyrolase, 79-0105
Factors influencing metabolism/toxicity
Interactions, 79-0105
Liver
Animals/experimental, 79-0105
In vitro, 79-0105
Muscle, striated
In vitro, 79-0677
Parasympathetic nerves
Animals/experimental, 79-0417
Reproduction/growth
In vitro, 79-0619
Toxicity/experimental animals
Mouse, 79-0104

DFP analogs
see also Organophosphates
Enzyme activity
β-Glucuronidase, 79-0143
Lysozyme, 79-0143

Dialifor
see also Organophosphates
Residues/food and feed
Fruits, 79-0019
Toxicity/humans
Occupational, 79-0601, 79-0608
Toxicity/non-target organisms
Human, 79-0019

Diazinon
see also Organophosphates
Absorption
Fish, 79-0643
Molluscs, 79-0643
Chromatography
Gas-liquid, 79-0471
Embryo/fetus
Animals/experimental, 79-0203
Enzyme activity
General, 79-0203

Diazinon (cont'd)
Glutathione *S*-transferase 79-0411
Factors influencing metabolism/toxicity
Biological magnification, 79-0643
Interactions, 79-0386
Immunology
Animals/experimental, 79-0581
Human, 79-0581
Mutagenesis/teratogenesis
Animals/experimental, 79-0203
Residue dynamics, 79-0308
Residues/plants
Ornamentals, 79-0516
Residues/soil
General, 79-0516
Residues/water
Wastewater, 79-0308
Toxicity/experimental animals
Bee, 79-0386, 79-0421

Dichlofluanid
see also Fungicides
Biochemical effects
Microorganisms, 79-0194
Photodecomposition, 79-0051
Residues/food and feed
Fruits, 79-0518

3,4-Dichloroaniline
see also Herbicide derived compounds
Residues/water
Paddy water, 79-0570

3,4-Dichloronitrobenzene
see also Herbicide derived compounds
Enzyme activity
Glutathione *S*-transferase 79-0411

Dichlorprop
Chromatography
Gas-liquid, 79-0744

Dichlorvos
see also Organophosphates
Brain
Animals/experimental, 79-0368
Embryo/fetus
Animals/experimental, 79-0208
Enzyme activity
Cholinesterase, 79-0373, 79-0374
Glucose 6-phosphate dehydrogenase, 79-0368
Immunology
Human, 79-0597
Mutagenesis/teratogenesis
Animals/experimental, 79-0208
Microorganisms, 79-0379
Spectrometry
Infrared, 79-0740
Thyroid
Animals/experimental, 79-0208
Toxicity/experimental animals
Rat, 79-0368
Treatment of poisoning
Oximes, 79-0373, 79-0374

Dicofol
Residues/air
Greenhouse, 79-0288

Dicrotophos
see also Organophosphates
Biotransformation
Human, 79-0573
Growth
Animals/experimental, 79-0130
Mutagenesis/teratogenesis
Animals/experimental, 79-0130
Skeleton/bone
Animals/experimental, 79-0130
Toxicity/humans
Intentional, 79-0573

Dieldrin
see also Organochlorines
Absorption
Plankton/algae, 79-0371
Rabbit, 79-0707
Androgens
Animals/experimental, 79-0385
Biochemical effects
Animals/experimental, 79-0123
Carcinogenesis
Animals/experimental, 79-0169
Human, 79-0514
Distribution/storage
Rabbit, 79-0707
Turkey, 79-0195, 79-0353
Enzyme activity
Alkaline phosphatase, 79-0147
Aryl hydrocarbon hydroxylase 79-0629
ATPase, 79-0714
Excretion
Chicken, 79-0359
Turkey, 79-0195
Factors influencing metabolism/ toxicity
Nutritional state, 79-0195
Taxon, 79-0397
Growth
Microorganisms, 79-0117
Lipids/steroids/sterols
Animals/experimental, 79-0147
Liver
Animals/experimental, 79-0123 79-0147, 79-0397
Metabolism
Annelids, 79-0647
Turkey, 79-0195
Microsomes
Animals/experimental, 79-0123
Prevention
Decontamination, 79-0314
Reproductive organs, male
Animals/experimental, 79-0385
Residues/food and feed
Dairy products, 79-0046, 79-0545 79-0546
Fish, 79-0545, 79-0557
Meat, 79-0545
Residues/humans
General, 79-0544
Milk, 79-0523

Dieldrin (cont'd)
Organs, 79-0514, 79-0543
Residues/non-target organisms
General, 79-0571
Birds, 79-0553, 79-0554, 79-0555 79-0556
Eggs, 79-0341, 79-0554
Fish, 79-0577
Residues/soil
Volatilization, 79-0045
Residues/water
Oceans/seas, 79-0571
Respiration, cellular
Microorganisms, 79-0117
Reviews
Monitoring and residues, 79-0571
Thyroid
Animals/non-target, 79-0577
Toxicity/experimental animals
Rabbit, 79-0397
Rat, 79-0397
Toxicity/non-target organisms
Birds, 79-0341
Crustacea, 79-0579
Microorganisms, 79-0117

Diflubenzuron
see also Insect hormones
Biochemical effects
Animals/experimental, 79-0445
Toxicity/non-target organisms
General, 79-0328

Dimethoate
see also Organophosphates
Embryo/fetus
Animals/experimental, 79-0148
Factors influencing metabolism/ toxicity
Age, 79-0148
Residue degradation
Soil, 79-0283
Residues/soil
General, 79-0282
Movement, 79-0281
Safety standards
TLV/MAC, 79-0346
Toxicity/humans
Occupational, 79-0601, 79-0608

Dimuron
see also Herbicides
Absorption
Rat, 79-0435
Excretion
Rat, 79-0435
Metabolism
Rat, 79-0435

Dinobuton
see also Fungicides
Cytological effects
In vitro, 79-0140
Residues/air
Greenhouse, 79-0140, 79-0288

Dinocap
see also Fungicides
Residues/air
Greenhouse, 79-0288

Dinocap (cont'd)
Spectrometry
Colorimetry, 79-0736

Dioxins
see also 2,4,5-T
Analysis
Sample preparation, 79-0224
Biochemical effects
Animals/experimental, 79-0087 79-0180
Carcinogenesis
General, 79-0085
Animals/experimental, 79-0175 79-0176
Chromatography
Gas-liquid, 79-0224, 79-0241
Distribution/storage
General, 79-0172
Electrolytes
Animals/experimental, 79-0193
Enzyme activity
General, 79-0179
Aldehyde dehydrogenase, 79-0631
Aryl hydrocarbon hydroxylase 79-0193, 79-0629
Mixed function oxidases, 79-0456
Monoamine oxidase, 79-0177
UDP-Glucuronyltransferase 79-0378
Estrogens
Animals/experimental, 79-0178
Experimental design
Monitoring and residues, 79-0264
Factors influencing metabolism/ toxicity
Interactions, 79-0131
Taxon, 79-0173
Fertility/sterility
Animals/experimental, 79-0178
Fibroblasts
Animals/experimental, 79-0378
Immunology
Animals/experimental, 79-0180
In vitro, 79-0181
Liver
Animals/experimental, 79-0453
Metabolism
General, 79-0172
Morbidity and mortality statistics
Italy, 79-0073
Mutagenesis/teratogenesis
Animals/experimental, 79-0178 79-0179
Human, 79-0073, 79-0085
Neonate
Animals/experimental, 79-0179
Nucleic acids
Animals/experimental, 79-0177
Phagocytes
Animals/experimental, 79-0612
Photodecomposition, 79-0302 79-0312
Porphyrins/pigments
Animals/experimental, 79-0175
In vitro, 79-0425
Prevention
Decontamination, 79-0274

Dioxins (cont'd)
Decontamination, 79-0331
Residue degradation
Water, 79-0264
Residues/air
Industrial, 79-0024, 79-0048
Respiration, cellular
In vitro, 79-0425
Spectrometry
Mass spectrometry, 79-0224
79-0241
Spleen
Animals/experimental, 79-0180
In vitro, 79-0181
Therapeutic use
Cancer, 79-0177
Toxicity/experimental animals
General, 79-0209
Rat, 79-0378
Toxicity/humans
General, 79-0081
Toxicity/non-target organisms
General, 79-0331

Diquat
see also Herbicides
Chromatography
Gas-liquid, 79-0478
Reviews
Epidemiology, prevention, and treatment, 79-0088
Toxicity/humans
Intentional, 79-0599

Disparlure
see also Insect hormones
Analysis
Sample preparation, 79-0473
Chromatography
Gas-liquid, 79-0473
Experimental design
Monitoring and residues, 79-0473

Disulfoton
see also Organophosphates
Brain
Animals/experimental, 79-0197
Enzyme activity
General, 79-0144
Acid phosphatase, 79-0404
ALA-synthetase, 79-0403
Alkaline phosphatase, 79-0404
Cytochrome oxidase, 79-0403
Factors influencing metabolism/toxicity
Sex, 79-0403, 79-0404
Lipids/steroids/sterols
Animals/experimental, 79-0144
79-0197
Microsomes
Animals/experimental, 79-0144
Residue dynamics, 79-0277

Diuron
see also Herbicides
Bioassay, 79-0747
Chromatography
Gas-liquid, 79-0747
Thin-layer, 79-0747

Diuron (cont'd)
Residue degradation
Soil, 79-0565
Water, 79-0747
Residues/water
Irrigation water, 79-0566

DNOC
see also Fungicides; Herbicides; Nitro compounds
Morbidity and mortality statistics
Germany (DDR), 79-0345
Toxicity/humans
Occupational, 79-0345

DSMA
see also Herbicides
Factors influencing metabolism/toxicity
Interactions, 79-0455
Nervous system
Animals/experimental, 79-0455

EDMM
see also Organophosphates
Factors influencing metabolism/toxicity
Route, 79-0613

Endosulfan
see also Organochlorines
Metabolism
Plants, 79-0361
Residue removal
Food and feed, 79-0513
Residues/food and feed
Coffee beans, 79-0513
Vegetables, 79-0279
Toxicity/experimental animals
Fish, 79-0096

Endosulfan isomers
see also Organochlorines
Metabolism
Rabbit, 79-0442

Endrin
see also Organochlorines
Enzyme activity
General, 79-0116
Acid phosphatase, 79-0404
79-0637
Alkaline phosphatase, 79-0404
79-0637
Cytochrome oxidase, 79-0403
Glucose 6-phosphate dehydrogenase, 79-0637
Factors influencing metabolism/toxicity
Sex, 79-0404
Liver
Animals/experimental, 79-0648
Microsomes
Animals/experimental, 79-0116
Residues/non-target organisms
Birds, 79-0548
Eggs, 79-0548
Respiration, cellular
Animals/experimental, 79-0116
Reviews

Endrin (cont'd)
Epidemiology, prevention, and treatment, 79-0324
Toxicity/experimental animals
Fish, 79-0096

EPN
see also Organophosphates
Biotransformation
Mouse, 79-0734
Factors influencing metabolism/toxicity
Interactions, 79-0734
Nervous system
Animals/experimental, 79-0460
Polyneuritis
Animals/experimental, 79-0696

Ethion
see also Organophosphates
Factors influencing metabolism/toxicity
General, 79-0299
Residue degradation
Food and feed, 79-0026, 79-0299
Residues/food and feed
Fruits, 79-0299, 79-0301
Safety standards
Reentry time, 79-0026, 79-0299

Ethyl parathion
see Parathion

Ethylene dibromide
Embryo/fetus
Animals/experimental, 79-0717
Factors influencing metabolism/toxicity
Pregnancy, 79-0717
Taxon, 79-0717
Toxicity/experimental animals
Mouse, 79-0717
Rat, 79-0717

Ethylene thiourea
see also Fungicides
Analysis
Sample preparation, 79-0474
Experimental design
Monitoring and residues, 79-0474
Factors influencing metabolism/toxicity
Interactions, 79-0649
Liver
Animals/experimental, 79-0649
Residue degradation
Food and feed, 79-0054
Residues/food and feed
Vegetables, 79-0033
Thyroid
Animals/experimental, 79-0649

Ethylmercuric *p*-toluenesulfanilide
Brain
Animals/experimental, 79-0663
Enzyme activity
General, 79-0663

Etrimfos
see also Organophosphates
Liver

Etrimfos (cont'd)
Animals/experimental, 79-0191
Metabolism
In vitro, 79-0191

Fenitrothion
see also Organophosphates
Analysis
Sample preparation, 79-0486
Bioassay, 79-0357, 79-0469
Biotransformation
Mouse, 79-0734
Blood cells
Animals/experimental, 79-0402
Distribution/storage
Rat, 79-0694
Enzyme activity
General, 79-0408
Aliesterase, 79-0398
Cholinesterase, 79-0077, 79-0402
Excretion
Rat, 79-0694
Factors influencing metabolism/toxicity
Disease state, 79-0125, 79-0126
Formulation, 79-0125, 79-0126
Interactions, 79-0125, 79-0126 79-0734
Schedule of dosage, 79-0398
Gametogenesis
Animals/experimental, 79-0146
Hormones
Animals/experimental, 79-0636
Lipids/steroids/sterols
Animals/experimental, 79-0695
In vitro, 79-0695
Metabolism
Fish, 79-0408
Microsomes
Animals/experimental, 79-0434
Porphyrins/pigments
Animals/experimental, 79-0389 79-0434
Prevention
General, 79-0576
Reproductive organs, female
Animals/experimental, 79-0146
Residues/plants
Forest, 79-0025
Respiration, cellular
Animals/experimental, 79-0434
Reticuloendothelial system
Animals/experimental, 79-0700
Reye's Syndrome
Human, 79-0077
Safety standards
TLV/MAC, 79-0346
Toxicity rating class, 79-0357
Spectrometry
Colorimetry, 79-0743
Toxicity/experimental animals
General, 79-0436
Dog, 79-0697
Fish, 79-0357
Monkey, 79-0697
Mouse, 79-0398
Rat, 79-0694
Toxicity/humans

Fenitrothion (cont'd)
Accidental, 79-0508
Vision
Animals/experimental, 79-0389

Fenitrothion derived compounds
see also Organophosphates
Toxicity/experimental animals
General, 79-0436

Fensulfothion
Chromatography
Gas-liquid, 79-0731

Fenthion
see also Organophosphates
Chromatography
Gas-liquid, 79-0233
Porphyrins/pigments
Animals/experimental, 79-0391
Safety standards
TLV/MAC, 79-0668
Toxicity/experimental animals
Guinea pig, 79-0668
Mouse, 79-0668
Rat, 79-0391, 79-0668
Vision
Animals/experimental, 79-0391

Ferbam
see also Fungicides
Mutagenesis/teratogenesis
Microorganisms, 79-0428

Fluometuron
see also Herbicides
Biotransformation
Microorganisms, 79-0439

Folpet
Chromosomes/genes
In vitro, 79-0121
Embryo/fetus
Animals/experimental, 79-0113
Growth
In vitro, 79-0121
Mutagenesis/teratogenesis
Animals/experimental, 79-0113 79-0121
In vitro, 79-0121
Toxicity/experimental animals
Chicken, 79-0113

Fonofos
see also Organophosphates
Metabolism
Insects, 79-0186
Mouse, 79-0186

Fumigants
see Carbon disulfide; DBCP; Methyl bromide; Methyl isothiocyanate

Fungicides
see also Benomyl; Biphenyl; Captafol Captan; Carbendazim; Carboxin; Chlordimeform; Cycloheximide; Dichlofluanid; Dinobuton; Dinocap; DNOC; Ethylene thiourea; Ferbam; Hexachlorobenzene; IBP; Mancozeb Maneb; Methyl isothiocyanate;

Fungicides (cont'd)
see also Oxycarboxin *o*-Phenylphenol; Phthalide; PMA; Polyoxin D; Quazatine; Quintozene; Thiophanate-methyl; Thiram; Trichlorophenol; Tridemorph; Zineb; Ziram
Economics, 79-0253
Enzyme activity
General, 79-0202
Mixed function oxidases, 79-0719
Growth
Microorganisms, 79-0202
Laws and regulations
Japan, 79-0498
Microsomes
Animals/experimental, 79-0719
Residues/food and feed
Fruits, 79-0030
Vegetables, 79-0030
Reviews
Analysis, 79-0498
Toxicology and pharmacology 79-0723
Toxicity/experimental animals
Fish, 79-0723
Microorganisms, 79-0202
Toxicity/non-target organisms
Invertebrates, 79-0354
Vitamins/coenzymes
Animals/experimental, 79-0719

Gd-42
see also Organophosphates
Enzyme activity
Cholinesterase, 79-0651
Factors influencing metabolism/toxicity
Interactions, 79-0651

Glyphosate
see also Herbicides
Chromatography
Thin-layer, 79-0226

Heavy metals
Bioassay, 79-0469
Enzyme activity
Carbonate dehydratase, 79-0449
Experimental design
Toxicology and pharmacology 79-0424
Residues/non-target organisms
Birds, 79-0552
Toxicity/non-target organisms
Cat, 79-0336
Dog, 79-0336
Vitamins/coenzymes
Animals/experimental, 79-0449

Heptachlor
see also Organochlorines
Experimental design
Monitoring and residues, 79-0265
Residues/air
Urban, 79-0265
Residues/food and feed
Meat, 79-0032

Heptachlor (cont'd)
Residues/water
Rivers/streams, 79-0515

Heptachlor derived compounds
Photodecomposition, 79-0529

Heptachlor epoxide
see also Organochlorines
Residues/food and feed
Dairy products, 79-0046, 79-0545 79-0546
Fish, 79-0545
Meat, 79-0032, 79-0545
Residues/non-target organisms
Birds, 79-0555

Herbicide antidotes
Reviews
General, 79-0005

Herbicide derived compounds
see also 4-Chloroaniline; 3,4-Dichloroaniline; 3,4-Dichloronitrobenzene
Biotransformation
In vitro, 79-0627
Residue degradation
Soil, 79-0526
Residues/soil
Adsorption, 79-0526

Herbicides
see also Acrolein; Ametryne; Asulam; Atrazine; Bromacil; Bromoxynil octanoate; Butralin; Buturon; Chlorbromuron; Chlormequat chloride; Chlorothalonil; Chlorpropham; Chlorthiamid; Chlortoluron; CNP; Cycloate; 2,4-D; DCPA; Dimuron; Diquat; Diuron; DNOC; DSMA; Fluometuron; Glyphosate; Lenacil; Linuron; MCPA; MCPB; Mecoprop; Metachlor; Methazole; Methyl isothiocyanate; Metobromuron; Metribuzin; Meturin; Molinate; Monolinuron; Monuron; Napropamide; Nitrofen; Oryzalin; Paraquat; PCP; Pebulate; Picloram; Propanil; Propham; Pyrazon; Silvex; Simazine; Sodium chlorate; 2,4,5-T; Terbacil; Trifluralin
Analysis
Sample preparation, 79-0238 79-0749
Bioassay, 79-0249, 79-0468
Biotransformation
Microorganisms, 79-0438, 79-0669
Plankton/algae, 79-0349
Plants, 79-0124
Chromatography
Gas-liquid, 79-0741
Chromosomes/genes
Plants, 79-0139
Economics, 79-0253
Environmental pollution, 79-0257
Enzyme activity
General, 79-0202, 79-0709
Excretion
Rat, 79-0153
Fertility/sterility
Plants, 79-0139
Growth
Microorganisms, 79-0202
Immunology
Human, 79-0609
Laws and regulations
Japan, 79-0498
Metabolism
Microorganisms, 79-0669
Plants, 79-0159
Rat, 79-0153
Mitosis/meiosis
Plants, 79-0139
Reproduction/growth
Microorganisms, 79-0702
Residue degradation
Soil, 79-0065, 79-0303, 79-0349
Residues/food and feed
Fruits, 79-0030
Vegetables, 79-0030
Residues/soil
General, 79-0159
Adsorption, 79-0036
Movement, 79-0040
Volatilization, 79-0045
Residues/water
Groundwater/rain, 79-0050
Lakes/ponds, 79-0049
Reviews
General, 79-0252, 79-0257
Analysis, 79-0498
Toxicology and pharmacology 79-0723
Skin
Human, 79-0609
Toxicity/experimental animals
Fish, 79-0723
Microorganisms, 79-0202
Toxicity/non-target organisms
Invertebrates, 79-0354
Microorganisms, 79-0347

Hexachlorobenzene
see also Fungicides
Absorption
Chicken, 79-0414
Biotransformation
Plants, 79-0115
Blood cells
Animals/experimental, 79-0170
In vitro, 79-0170
Chromatography
Gas-liquid, 79-0243
Thin-layer, 79-0243
Distribution/storage
Chicken, 79-0414
Sheep, 79-0675
Enzyme activity
General, 79-0645
Aryl hydrocarbon hydroxylase 79-0629
Excretion
Sheep, 79-0675
Experimental design
Toxicology and pharmacology 79-0654
Fertility/sterility
Animals/experimental, 79-0414
Growth
Animals/experimental, 79-0101
Immunology
Animals/experimental, 79-0170
In vitro, 79-0170
Laws and regulations
Japan, 79-0255
Metabolism
Animals/experimental, 79-0101
Rat, 79-0653
Porphyrins/pigments
Animals/experimental, 79-0101
Human, 79-0584
Prevention
Disposal, 79-0090
Residues/food and feed
Dairy products, 79-0053
Fish, 79-0519
Meat, 79-0032
Residues/humans
Adipose, 79-0015, 79-0539
Milk, 79-0015
Organs, 79-0539
Residues/non-target organisms
Fish, 79-0519
Respiration, cellular
Animals/experimental, 79-0646
Spleen
Animals/experimental, 79-0170
In vitro, 79-0170
Toxicity/experimental animals
Monkey, 79-0152
Plankton/algae, 79-0646
Rat, 79-0152
Toxicity/humans
Accidental, 79-0584

Hydroxychlordene
see Heptachlor derived compounds

IBP
see also Fungicides
Distribution/storage
Sheep, 79-0211
Enzyme activity
Cholinesterase, 79-0211
Residues/food and feed
Meat, 79-0211

Insect hormones
see also Diflubenzuron; Disparlure
Residues/air
Industrial, 79-0024, 79-0048
Toxicity/experimental animals
Fish, 79-0114
Guinea pig, 79-0171
Monkey, 79-0171
Mouse, 79-0171

Iomex
Biochemical effects
Animals/experimental, 79-0400

IPO-63
Absorption
Cow, 79-0724
Fertility/sterility
Animals/experimental, 79-0724
Gametogenesis
Animals/experimental, 79-0724

Kepone
see Chlordecone

Lauryl sulfate
Factors influencing metabolism/toxicity
Interactions, 79-0701

Lenacil
see also Herbicides
Respiration, cellular
Microorganisms, 79-0216

Leptophos
see also Organophosphates
Absorption
Chicken, 79-0184
Distribution/storage
Rat, 79-0694
Enzyme activity
Acid phosphatase, 79-0207 79-0628
Cholinesterase, 79-0207, 79-0694
Excretion
Distribution/storage, 79-0457
Rat, 79-0694
Factors influencing metabolism/toxicity
Schedule of dosage, 79-0184
Polyneuritis
Animals/experimental, 79-0628 79-0696, 79-0718
Toxicity/experimental animals
Chicken, 79-0718
Fish, 79-0096
Monkey, 79-0694

Lindane
see also Organochlorines
Adrenal
Animals/experimental, 79-0214
Human, 79-0214
Biotransformation
Plants, 79-0115, 79-0639
Blood cells
Human, 79-0578
Brain
Animals/experimental, 79-0715
Carcinogenesis
Human, 79-0514
Catecholamines
Animals/experimental, 79-0214
Human, 79-0214
Chromatography
Gas-liquid, 79-0482
HPL, 79-0482
Enzyme activity
General, 79-0387
Mixed function oxidases, 79-0396
Excretion
Cow, 79-0167
Factors influencing metabolism/toxicity
Interactions, 79-0715
Nutritional state, 79-0138
Liver
Animals/experimental, 79-0387 79-0396, 79-0626
Lysosomes, 79-0626
Metabolism
Annelids, 79-0647
Rat, 79-0138, 79-0652
Peripheral nerves
Human, 79-0602
Reproductive organs, male
Animals/experimental, 79-0387
Residue removal
Food and feed, 79-0513
Residues/food and feed
Coffee beans, 79-0513
Dairy products, 79-0546
Meat, 79-0032
Vegetables, 79-0305
Residues/humans
Organs, 79-0514
Residues/non-target organisms
Birds, 79-0556
Residues/water
Lakes/ponds, 79-0028
Paddy water, 79-0570
Rivers/streams, 79-0515
Toxicity/experimental animals
Rat, 79-0387
Toxicity/humans
Occupational, 79-0602

Linuron
see also Herbicides
Factors influencing metabolism/toxicity
Interactions, 79-0350
Metabolism
Microorganisms, 79-0350
Plants, 79-0535
Mutagenesis/teratogenesis
Animals/experimental, 79-0454
Residue degradation
Soil, 79-0535
Residues/soil
General, 79-0310, 79-0535

Malathion
see also Organophosphates
Absorption
Rabbit, 79-0707
Biochemical effects
Animals/experimental, 79-0405
Biotransformation
Fish, 79-0145
Human, 79-0573
Mouse, 79-0734
Carcinogenesis
Animals/experimental, 79-0685
Chromatography
Gas-liquid, 79-0471
Distribution/storage
Rabbit, 79-0707
Enzyme activity
General, 79-0145
Acid phosphatase, 79-0404
Factors influencing metabolism/toxicity
Interactions, 79-0734
Sex, 79-0404
Mutagenesis/teratogenesis
Animals/experimental, 79-0454
Peripheral nerves
Human, 79-0572, 79-0602
Prevention
Decontamination, 79-0315 79-0320
Disposal, 79-0320
Residue dynamics, 79-0308
Residues/air
Rural, 79-0028
Residues/food and feed
Fruits, 79-0301
Residues/water
Wastewater, 79-0308
Spectrometry
UV, 79-0729
Therapeutic use
Pediculosis, 79-0440
Toxicity/experimental animals
Fish, 79-0096
Toxicity/humans
General, 79-0322, 79-0323 79-0440
Intentional, 79-0572, 79-0610
Occupational, 79-0573, 79-0602
Treatment of poisoning
Atropine, 79-0440

Mancozeb
see also Fungicides
Residues/food and feed
Fruits, 79-0270
Vegetables, 79-0271

Maneb
see also Fungicides
Growth
Microorganisms, 79-0117
Immunology
Human, 79-0597
Kidney
Animals/experimental, 79-0119
Prevention
Disposal, 79-0317
Residue degradation
General, 79-0317
Residues/food and feed
Vegetables, 79-0271
Respiration, cellular
Microorganisms, 79-0117
Skin
Animals/experimental, 79-0119
Toxicity/experimental animals
Amphibians, 79-0119
Toxicity/non-target organisms
Microorganisms, 79-0117

MCPA
see also Herbicides
Chromatography
Gas-liquid, 79-0494
Thin-layer, 79-0750

MCPA (cont'd)
Spectrometry
General, 79-0493

MCPB
see also Herbicides
Spectrometry
General, 79-0493

MCPP
see Mecoprop

Mecoprop
see also Herbicides
Spectrometry
General, 79-0493

Mephospholan
Biotransformation
Plants, 79-0671
Electrometry
Polarography, 79-0727

Mercurials
Chromatography
Gas-liquid, 79-0247
Factors influencing metabolism/toxicity
Interactions, 79-0455
Nervous system
General, 79-0218
Animals/experimental, 79-0455
Residues/food and feed
Fish, 79-0542, 79-0557
Poultry, 79-0064
Residues/non-target organisms
Bats, 79-0517
Birds, 79-0556
Chicken, 79-0064
Fish, 79-0542
Residues/soil
Volatilization, 79-0056
Residues/water
Lakes/ponds, 79-0267

Metachlor
see also Herbicides
Growth
Microorganisms, 79-0536

Methamidophos
Enzyme activity
Cholinesterase, 79-0706
Metabolism
Insects, 79-0706
Mouse, 79-0706

Methazole
see also Herbicides
Residue degradation
Soil, 79-0564, 79-0565

Methidathion
see also Organophosphates
Residues/food and feed
Fruits, 79-0301

Methomyl
see also Carbamates
Bioassay, 79-0469
Toxicity/humans
Intentional, 79-0610

Methomyl (cont'd)
Occupational, 79-0601, 79-0608

Methoxychlor
see also Organochlorines
Amino acids/peptides/proteins
In vitro, 79-0712
Biotransformation
In vitro, 79-0630
Estrogens
Animals/experimental, 79-0630
Lipids/steroids/sterols
In vitro, 79-0712
Mutagenesis/teratogenesis
Animals/experimental, 79-0454
Photodecomposition, 79-0022
Residues/soil
Adsorption, 79-0020

Methyl bromide
Musculoskeletal system
Human, 79-0089
Residues/soil
Volatilization, 79-0291
Spectrometry
Fluorometry, 79-0748

Methyl demeton
see also Organophosphates
Toxicity/experimental animals
Water buffalo, 79-0409

Methyl iodide
Enzyme activity
Glutathione *S*-transferase
79-0411

Methyl isothiocyanate
see also Fungicides; Herbicides
Growth
Microorganisms, 79-0117
Respiration, cellular
Microorganisms, 79-0117
Toxicity/non-target organisms
Microorganisms, 79-0117

Methyl parathion
see also Organophosphates
Behavior
Animals/experimental, 79-0720
Chromatography
Gas-liquid, 79-0471
Enzyme activity
Cholinesterase, 79-0196
Glutathione *S*-transferase
79-0411
Peroxidase, 79-0196
Factors influencing metabolism/toxicity
Interactions, 79-0196
Prevention
Disposal, 79-0317
Residue degradation
General, 79-0317
Spectrometry
Colorimetry, 79-0743
Toxicity/experimental animals
Crustacea, 79-0720
Fish, 79-0720

Metiram
Residues/food and feed
Fruits, 79-0270

Metobromuron
see also Herbicides
Metabolism
Plants, 79-0164
Toxicity/experimental animals
Plants, 79-0164

Metribuzin
see also Herbicides
Analysis
Sample preparation, 79-0496
Chromatography
Gas-liquid, 79-0496
Residue degradation
Soil, 79-0041, 79-0268
Residues/soil
Volatilization, 79-0268

Meturin
see also Herbicides
Residue degradation
Soil, 79-0534
Residues/soil
General, 79-0534

Meturin derived compounds
Residue degradation
Soil, 79-0534
Residues/soil
General, 79-0534

Mevinphos
Blood pressure
Animals/experimental, 79-0615

Milbex
Enzyme activity
Mixed function oxidases, 79-0396
Liver
Animals/experimental, 79-0396

Mirex
see also Organochlorines
Biochemical effects
Animals/experimental, 79-0187
Distribution/storage
Rat, 79-0133
Enzyme activity
Aldehyde dehydrogenase, 79-0631
Cytochrome P-450, 79-0187
Excretion
Rat, 79-0133
Factors influencing metabolism/toxicity
Nutritional state, 79-0462
Fertility/sterility
Animals/experimental, 79-0462
Liver
Animals/experimental, 79-0187
79-0384
Prevention
Disposal, 79-0317, 79-0319
Residue degradation
General, 79-0317
Residues/non-target organisms
Birds, 79-0555
Fish, 79-0558, 79-0577

Mirex (cont'd)
Molluscs, 79-0558
Plankton/algae, 79-0558
Residues/water
Estuaries/marshes, 79-0558
Thyroid
Animals/non-target, 79-0577
Toxicity/experimental animals
Rat, 79-0384

Molinate
see also Herbicides
Absorption
Rat, 79-0667
Biotransformation
Rat, 79-0155, 79-0667
Distribution/storage
Rat, 79-0667
Metabolism
Rat, 79-0154, 79-0155, 79-0394
Residues/water
Paddy water, 79-0570

Molluscicides
see Clonitralid; Trifenmorph

Monocrotophos
see also Organophosphates
Residues/food and feed
Vegetables, 79-0278
Toxicity/non-target organisms
Birds, 79-0326

Monolinuron
see also Herbicides
Absorption
Plants, 79-0190
Biotransformation
Plants, 79-0190

Monuron
see also Herbicides
Prevention
Decontamination, 79-0321

Monuron derived compounds
Biotransformation
Plants, 79-0522
Residues/soil
General, 79-0522

MTMC
Reticuloendothelial system
Animals/experimental, 79-0700

Napropamide
see also Herbicides
Residues/soil
General, 79-0511

Niclosamide
see Clonitralid

Nicotine
Residues/air
Greenhouse, 79-0039

Nitro compounds
see also DNOC
Chromatography
Gas-liquid, 79-0746
Thin-layer, 79-0746
Spectrometry

Nitro compounds (cont'd)
Mass spectrometry, 79-0746

Nitrofen
see also Herbicides
Carcinogenesis
Animals/experimental, 79-0674
Factors influencing metabolism/toxicity
Sex, 79-0674
Pancreas (exocrine)
Animals/experimental, 79-0674
Skin
Human, 79-0334
Toxicity/humans
Accidental, 79-0334
Occupational, 79-0334

Obidoxime
Enzyme activity
Cholinesterase, 79-0672
Factors influencing metabolism/toxicity
Interactions, 79-0672

Omite
see Propargite

Organochlorines
see also Aldrin; BHC; BHC isomers; Chlordane; Chlordecone; DDE DDT; DDT derived compounds; Dieldrin; Endosulfan; Endosulfan isomers; Endrin; Heptachlor; Heptachlor epoxide; Lindane; Methoxychlor; Mirex; Oxychlordane; Polychloropinene; TDE; Toxaphene
Absorption
Chicken, 79-0149
Adrenal
Animals/experimental, 79-0214
Human, 79-0214
Analysis
Sample preparation, 79-0228 79-0733, 79-0749
Biochemical effects
Animals/experimental, 79-0087
Biotransformation
Microorganisms, 79-0722
Carcinogenesis
General, 79-0128
Animals/experimental, 79-0451
Catecholamines
Animals/experimental, 79-0214
Human, 79-0214
Chromatography
Gas-liquid, 79-0225, 79-0228 79-0243, 79-0481, 79-0485 79-0488, 79-0733, 79-0746
Thin-layer, 79-0225, 79-0236 79-0243, 79-0746
Digestive system
Human, 79-0069
Distribution/storage
Chicken, 79-0149
Electrometry
Conductometry, 79-0485
Environmental pollution, 79-0254

Organochlorines (cont'd)
Environmental pollution, 79-0465 79-0607
Experimental design
Analysis, 79-0488
Factors influencing metabolism/toxicity
Biological magnification, 79-0568
Disease state, 79-0075
Growth
Microorganisms, 79-0095
Immunology
Human, 79-0609
Liver
Human, 79-0069
Mutagenesis/teratogenesis
General, 79-0128
Residue dynamics, 79-0275
Residues/food and feed
Fruits, 79-0030
Vegetables, 79-0030
Residues/humans
Adipose, 79-0294
Residues/non-target organisms
General, 79-0568
Birds, 79-0552
Residues/plants
Medicinals and condiments 79-0060
Tobacco, 79-0062
Residues/soil
General, 79-0038, 79-0568
Adsorption, 79-0062
Volatilization, 79-0260
Residues/water
Estuaries/marshes, 79-0568
Lakes/ponds, 79-0267
Reviews
Analysis, 79-0227
Monitoring and residues, 79-0254 79-0260
Toxicology and pharmacology 79-0149, 79-0254, 79-0722 79-0723
Reye's syndrome
Human, 79-0075
Safety standards
TLV/MAC, 79-0092
Skin
Human, 79-0609
Spectrometry
Mass spectrometry, 79-0735 79-0746
Toxicity/experimental animals
Fish, 79-0723
Toxicity/humans
General, 79-0075
Toxicity/non-target organisms
General, 79-0338
Fish, 79-0275
Helminths, 79-0465

Organophosphate derived compounds
Biotransformation
Microorganisms, 79-0620

Organophosphates
see also Acephate; Armine; Azin-

Organophosphates (cont'd)
see also phosmethyl Carbophenothion; Chlorfenvinphos; Chlorpyrifos; DAEP; DFP; DFP analogs; Dialifor; Diazinon; Dichlorvos; Dicrotophos; Dimethoate; Disulfoton; EDMM; EPN; Ethion; Etrimfos; Fenitrothion; Fenitrothion derived compounds; Fenthion; Fonofos; Gd-42; Leptophos; Malathion; Methidathion; Methyl demeton; Methyl parathion; Monocrotophos; Paraoxon; Parathion; Phorate; Phosalone; Phosmet; Pirimiphos-methyl; Prothoate; Quinalphos; Ronnel; Salithion; Soman; Temephos; Tetrachlorvinphos; Thiometon;Tri-*o*-cresyl phosphate; Trichlorfon; Trichloronate
Absorption
Fish, 79-0399
Analysis
Sample preparation, 79-0487 79-0733, 79-0749
Behavior
Animals/experimental, 79-0699
Bioassay, 79-0704
Chromatography
Gas-liquid, 79-0230, 79-0733 79-0746
Thin-layer, 79-0236, 79-0746
Environmental pollution, 79-0254
Enzyme activity
General, 79-0399
Cholinesterase, 79-0450, 79-0632
Experimental design
Analysis, 79-0487
Toxicology and pharmacology 79-0704
Factors influencing metabolism/ toxicity
Disease state, 79-0075
Interactions, 79-0151
pH, 79-0632
Growth
Microorganisms, 79-0095
Immunology
Human, 79-0609
Metabolism
In vitro, 79-0151
Microorganisms, 79-0683
Rat, 79-0151
Morbidity and mortality statistics
Japan, 79-0332, 79-0333
Mutagenesis/teratogenesis
Microorganisms, 79-0730
Nervous system
General, 79-0218
Polyneuritis
Animals/experimental, 79-0625 79-0696
In vitro, 79-0625
Residues/air
Greenhouse, 79-0039

Organophosphates (cont'd)
Residues/food and feed
Fruits, 79-0030, 79-0262
Vegetables, 79-0030
Residues/plants
Tobacco, 79-0062
Residues/soil
General, 79-0038
Adsorption, 79-0055, 79-0062
Volatilization, 79-0260
Reviews
Epidemiology, prevention, and treatment, 79-0324
Monitoring and residues, 79-0254 79-0260
Toxicology and pharmacology 79-0254, 79-0723
Reye's Syndrome
Human, 79-0075
Safety standards
TLV/MAC, 79-0092
Skin
Human, 79-0609
Spectrometry
Mass spectrometry, 79-0746
Toxicity/experimental animals
Fish, 79-0723
Insects, 79-0413
Mouse, 79-0413, 79-0699
Toxicity/humans
General, 79-0075, 79-0344
Accidental, 79-0603
Occupational, 79-0574
Toxicity/non-target organisms
General, 79-0338
Treatment of poisoning
Oximes, 79-0450
Vision
Human, 79-0332, 79-0333

Oryzalin
see also Herbicides
Chromatography
Gas-liquid, 79-0480

Ovex
Toxicity/experimental animals
Mouse, 79-0682

Oxamyl
see also Carbamates
Titration, 79-0223

Oxycarboxin
see also Fungicides
Chromatography
Gas-liquid, 79-0477

Oxychlordane
see also Organochlorines
Metabolism
Rabbit, 79-0163
Toxicity/experimental animals
Rabbit, 79-0163

Oxydemeton methyl
Brain
Animals/experimental, 79-0634

Paraoxon
see also Organophosphates
Biotransformation
In vitro, 79-0623
Enzyme activity
General, 79-0106
Paraoxonase, 79-0680
Experimental design
Monitoring and residues, 79-0447
Toxicology and pharmacology 79-0447
Factors influencing metabolism/ toxicity
Structure/function, 79-0680
Safety standards
Reentry time, 79-0447
Sympathetic nerves
Animals/experimental, 79-0624
Toxicity/humans
Experimental, 79-0680
Treatment of poisoning
General, 79-0106

Paraquat
see also Herbicides
Biochemical effects
Animals/experimental, 79-0657
Brain
Human, 79-0604
Carcinogenesis
Animals/experimental, 79-0641
Cartilage
Animals/experimental, 79-0363
Chromatography
Gas-liquid, 79-0235
HPL, 79-0235
Thin-layer, 79-0235
Experimental design
Analysis, 79-0463
Factors influencing metabolism/ toxicity
Interactions, 79-0641
Immunology
Human, 79-0597
Lung
Animals/experimental, 79-0110 79-0656, 79-0657
Animals/non-target, 79-0335
Morbidity and mortality statistics
Ireland, 79-0083
USA, 79-0343
Residues/plants
Marijuana, 79-0533
Reviews
Epidemiology, prevention, and treatment, 79-0088
Skin
Animals/experimental, 79-0363
Toxicity/experimental animals
Rabbit, 79-0110, 79-0656
Toxicity/humans
General, 79-0587
Accidental, 79-0533, 79-0604
Intentional, 79-0072, 79-0343
Occupational, 79-0084, 79-0325
Toxicity/non-target organisms
Dog, 79-0335
Treatment of poisoning

Paraquat (cont'd)
Hemoperfusion, 79-0340

Parathion
see also Organophosphates
Absorption
Rabbit, 79-0707
Androgens
Animals/experimental, 79-0385
Biotransformation
Human, 79-0573
In vitro, 79-0623
Mouse, 79-0734
Distribution/storage
Rabbit, 79-0707
Enzyme activity
General, 79-0387
Cholinesterase, 79-0459
Collagenase, 79-0109
Experimental design
Monitoring and residues, 79-0447
Toxicology and pharmacology 79-0447, 79-0459
Factors influencing metabolism/ toxicity
General, 79-0299
Interactions, 79-0386, 79-0734
Immunology
Animals/experimental, 79-0372
Liver
Animals/experimental, 79-0387
Mitochondria
Animals/experimental, 79-0381
Muscle, smooth
Animals/experimental, 79-0381
Mutagenesis/teratogenesis
Animals/experimental, 79-0217
Nervous system
Animals/experimental, 79-0460
Photodecomposition, 79-0023 79-0528
Prevention
Protective equipment, 79-0266
Reproductive organs, male
Animals/experimental, 79-0385 79-0387
Residue degradation
Air, 79-0528
Food and feed, 79-0026, 79-0299
Residues/food and feed
Fruits, 79-0027, 79-0299
Residues/humans
General, 79-0266
Residues/soil
Adsorption, 79-0055, 79-0057 79-0304, 79-0527
Residues/water
Paddy water, 79-0570
Safety standards
Reentry time, 79-0026, 79-0027 79-0299, 79-0447
Skeleton/bone
Animals/experimental, 79-0217
Toxicity/experimental animals
Bee, 79-0386
Molluscs, 79-0381
Rabbit, 79-0390
Rat, 79-0387

Parathion (cont'd)
Toxicity/humans
Intentional, 79-0610
Occupational, 79-0266, 79-0573
Vision
Animals/experimental, 79-0390

PCP
see also Herbicides
Absorption
Rabbit, 79-0380
Chromatography
Gas-liquid, 79-0489
Distribution/storage
Rabbit, 79-0380
Experimental design
Toxicology and pharmacology 79-0423
Factors influencing metabolism/ toxicity
Formulation, 79-0716
Molting, 79-0120
Growth
Animals/experimental, 79-0101
Integument
Animals/experimental, 79-0120
Laws and regulations
Japan, 79-0255
Liver
Animals/experimental, 79-0716
Metabolism
Animals/experimental, 79-0101
Porphyrins/pigments
Animals/experimental, 79-0101
Spectrometry
Mass spectrometry, 79-0491
Toxicity/experimental animals
Cow, 79-0420
Crustacea, 79-0120
Monkey, 79-0152
Plankton/algae, 79-0423
Rat, 79-0152, 79-0420
Toxicity/non-target organisms
Cat, 79-0606

Pebulate
see also Herbicides
Absorption
Rat, 79-0667
Biotransformation
Rat, 79-0667
Distribution/storage
Rat, 79-0667
Metabolism
Rat, 79-0394

Permethrin
see also Pyrethrins
Biotransformation
Chicken, 79-0415
Excretion
Chicken, 79-0415
Photodecomposition, 79-0293
Residue degradation
Soil, 79-0293

Phenamiphos
Chromatography
Gas-liquid, 79-0731

(3α-Phenyl-β-acetylene)-4-hydroxycoumarin
see also Rodenticides
Experimental design
Toxicology and pharmacology 79-0395
Safety standards
TLV/MAC, 79-0395
Toxicity/experimental animals
Rat, 79-0395

o-Phenylphenol
see also Fungicides
Factors influencing metabolism/ toxicity
Interactions, 79-0701
Mutagenesis/teratogenesis
General, 79-0429
Animals/experimental, 79-0431
In vitro, 79-0431
Toxicity/experimental animals
Mouse, 79-0701

Phorate
see also Organophosphates
Residue degradation
Soil, 79-0296
Water, 79-0037
Residue dynamics, 79-0296
Residues/water
Lakes/ponds, 79-0037

Phosalone
see also Organophosphates
Chromatography
Thin-layer, 79-0248
Enzyme activity
Mixed function oxidases, 79-0396
Liver
Animals/experimental, 79-0396
Residues/food and feed
Fruits, 79-0019
Safety standards
TLV/MAC, 79-0346
Toxicity/experimental animals
Bee, 79-0421
Toxicity/humans
Occupational, 79-0601, 79-0608
Toxicity/non-target organisms
Human, 79-0019

Phosmet
see also Organophosphates
Chromatography
Thin-layer, 79-0248
Therapeutic use
Scabies, 79-0419

Phosphamidon
Cytological effects
In vitro, 79-0140
Residues/air
Greenhouse, 79-0140

Phospholan
Electrometry
Polarography, 79-0727

Phthalide
see also Fungicides
Metabolism

Phthalide (cont'd)
Rat, 79-0102
Placental transfer
Animals/experimental, 79-0102

Picloram
see also Herbicides
Mutagenesis/teratogenesis
Animals/experimental, 79-0370
Residues/soil
Adsorption, 79-0527
Toxicity/experimental animals
Chicken, 79-0370
Eggs, 79-0370

Piperonyl butoxide
Analysis
General, 79-0499
Peripheral nerves
Human, 79-0602
Toxicity/humans
Occupational, 79-0602

Pirimicarb
see also Carbamates
Chromatography
Thin-layer, 79-0495

Pirimiphos-methyl
see also Organophosphates
Residues/food and feed
Cereals, 79-0521

PMA
see also Fungicides
Prevention
Decontamination, 79-0315

Polychlorinated biphenyls
Carcinogenesis
Animals/experimental, 79-0687
Chromatography
Gas-liquid, 79-0481
Eggshell effects
Animals/non-target, 79-0554
Environmental pollution, 79-0174
79-0507
Enzyme activity
Aldehyde dehydrogenase, 79-0631
Mixed function oxidases, 79-0356
Experimental design
Monitoring and residues, 79-0265
Factors influencing metabolism/
toxicity
Biological magnification, 79-0568
Nutritional state, 79-0703
Lipids/steroids/sterols
Animals/experimental, 79-0703
Liver
Animals/experimental, 79-0453
Prevention
Decontamination, 79-0314
79-0315, 79-0321
Disposal, 79-0090
Residue dynamics, 79-0275
Residues/air
Urban, 79-0265
Residues/food and feed
Fish, 79-0519, 79-0557
Residues/humans

Polychlorinated biphenyls (cont'd)
Adipose, 79-0015
Milk, 79-0015, 79-0052, 79-0523
Residues/non-target organisms
General, 79-0568, 79-0571
Birds, 79-0548, 79-0552, 79-0554
79-0555
Eggs, 79-0548, 79-0554
Fish, 79-0519, 79-0577
Plankton/algae, 79-0290
Residues/soil
General, 79-0568
Residues/water
Drinking water, 79-0549
Estuaries/marshes, 79-0568
Lakes/ponds, 79-0267
Oceans/seas, 79-0290, 79-0571
Rivers/streams, 79-0549
Reviews
Analysis, 79-0227
Monitoring and residues, 79-0571
Thyroid
Animals/non-target, 79-0577
Toxicity/humans
General, 79-0081
Toxicity/non-target organisms
Fish, 79-0275
Vitamins/coenzymes
Animals/experimental, 79-0703

Polychloropinene
see also Organochlorines
Bile
Animals/experimental, 79-0661
Chromatography
Gas-liquid, 79-0289
Factors influencing metabolism/
toxicity
Interactions, 79-0661
Residues/soil
General, 79-0289

Polyoxin B
Toxicity/experimental animals
Dog, 79-0690
Mouse, 79-0690
Rabbit, 79-0690

Polyoxin D
see also Fungicides
Cardiovascular system
Animals/experimental, 79-0183
Fertility/sterility
Animals/experimental, 79-0693
Musculoskeletal system
Animals/experimental, 79-0183
Mutagenesis/teratogenesis
Animals/experimental, 79-0693
Respiratory system
Animals/experimental, 79-0183
Toxicity/experimental animals
Mouse, 79-0692
Rat, 79-0691

Prometryne
Chromatography
Gas-liquid, 79-0728
Spectrometry
Mass spectrometry, 79-0728

Propanil
see also Herbicides
Residues/water
Oceans/seas, 79-0525
Paddy water, 79-0570

Propargite
Toxicity/humans
Occupational, 79-0601, 79-0608

Propazine
Chromatography
Gas-liquid, 79-0728
Spectrometry
Mass spectrometry, 79-0728

Propham
see also Herbicides
Photodecomposition, 79-0307
Residue degradation
In vitro, 79-0524
Water, 79-0307
Residues/water
General, 79-0307

Propoxur
see also Carbamates
EEG
Animals/experimental, 79-0644
Embryo/fetus
Animals/experimental, 79-0644
Enzyme activity
Acid phosphatase, 79-0404
ALA-synthetase, 79-0403
Cholinesterase, 79-0200
Cytochrome oxidase, 79-0403
Factors influencing metabolism/
toxicity
Sex, 79-0404
Neonate
Animals/experimental, 79-0644
Toxicity/experimental animals
Rat, 79-0200, 79-0644

Prothoate
see also Organophosphates
Factors influencing metabolism/
toxicity
Interactions, 79-0350
Metabolism
Microorganisms, 79-0350

Pyrazon
see also Herbicides
Residue degradation
Plants, 79-0261
Soil, 79-0261

Pyrethrins
see also Allethrin; Cismethrin;
Cypermethrin; Decamethrin;
Permethrin; Pyrethrum
Chromatography
Gas-liquid, 79-0237
Experimental design
Toxicology and pharmacology
79-0412
Immunology
Animals/experimental, 79-0412
Metabolism
Insects, 79-0157, 79-0189

Pyrethrins (cont'd)
Nervous system
In vitro, 79-0185
Peripheral nerves
Human, 79-0602
Toxicity/experimental animals
Amphibians, 79-0166
Fish, 79-0166
Toxicity/humans
Occupational, 79-0602

Pyrethrum
see also Pyrethrins
Enzyme activity
Alkaline phosphatase, 79-0392
Toxicity/experimental animals
Birds, 79-0448

Quazatine
see also Fungicides
Chromatography
Gas-liquid, 79-0497

Quinalphos
see also Organophosphates
Bioassay, 79-0357
Safety standards
Toxicity rating class, 79-0357
Toxicity/experimental animals
Fish, 79-0357

Quintozene
see also Fungicides
Residue degradation
Soil, 79-0016, 79-0158
Residues/food and feed
Vegetables, 79-0305

Ratone
see (3α-Phenyl-β-acetylene)-4-hydroxycoumarin

Rodenticides
see also (3α-Phenyl-β-acetylene)-4-hydroxycoumarin; Thallium; Vacor; Warfarin
Chromatography
Gas-liquid, 79-0221
Toxicity/non-target organisms
Cat, 79-0336
Dog, 79-0336
Small mammals, 79-0337

Ronnel
see also Organophosphates
Biotransformation
Human, 79-0573
Toxicity/experimental animals
Chicken, 79-0365
Rabbit, 79-0365
Toxicity/humans
Occupational, 79-0573

Rotenone
Carcinogenesis
Animals/experimental, 79-0710
Microtubules
In vitro, 79-0633

Salithion
see also Organophosphates
Immunology
Human, 79-0597

Silvex
see also Herbicides
Residues/soil
Adsorption, 79-0567

Simazine
see also Herbicides
Residues/soil
General, 79-0310, 79-0510
Movement, 79-0295
Residues/water
Groundwater/rain, 79-0295
Irrigation water, 79-0034, 79-0531
Toxicity/non-target organisms
Microorganisms, 79-0311

SKF-525A
Factors influencing metabolism/toxicity
Interactions, 79-0443

Sodium arsenite
see also Arsenicals
Residues/water
Lakes/ponds, 79-0273

Sodium bromide
Factors influencing metabolism/toxicity
Interactions, 79-0649

Sodium chlorate
see also Herbicides
Toxicity/humans
Accidental, 79-0600

Soman
see also Organophosphates
Brain
Animals/experimental, 79-0355
Enzyme activity
General, 79-0355
Parasympathetic nerves
Animals/experimental, 79-0377
Treatment of poisoning
HS-6, 79-0377

Strobane
Immunology
Animals/experimental, 79-0581
Human, 79-0581

Sulfanilamide
Metabolism
Microorganisms, 79-0161

Synergists
see Piperonyl butoxide

2,4,5-T
see also Herbicides
Analysis
Sample preparation, 79-0224 79-0742
Chromatography
Gas-liquid, 79-0224, 79-0245
Environmental pollution, 79-0256
Excretion
Rat, 79-0679
Factors influencing metabolism/toxicity
General, 79-0360
Taxon, 79-0676
Laws and regulations
USA-EPA, 79-0256
Metabolism
Plants, 79-0156, 79-0472
Mutagenesis/teratogenesis
Animals/experimental, 79-0360 79-0370
Human, 79-0082
Reproduction/growth
Animals/experimental, 79-0676
Residues/plants
Chaparral, 79-0520
Residues/soil
General, 79-0520
Adsorption, 79-0567
Residues/water
Lakes/ponds, 79-0028
Respiration, cellular
Microorganisms, 79-0216
Safety standards
General, 79-0011
Spectrometry
Mass spectrometry, 79-0224
Toxicity/experimental animals
General, 79-0209
Chicken, 79-0370
Eggs, 79-0370

2,3,6-TBA
Analysis
Sample preparation, 79-0479
Chromatography
Gas-liquid, 79-0479

TDE
see also Organochlorines
Adrenal
In vitro, 79-0410
Lipids/steroids/sterols
In vitro, 79-0410
Mutagenesis/teratogenesis
Human, 79-0352
Residue degradation
Soil, 79-0276
Residues/food and feed
Dairy products, 79-0046, 79-0053 79-0280
Meat, 79-0032
Residues/humans
Adipose, 79-0015
Milk, 79-0015
Residues/non-target organisms
Birds, 79-0555
Residues/soil
Volatilization, 79-0276
Therapeutic use
Cancer, 79-0100, 79-0204
Cushing's syndrome, 79-0352

Temephos
see also Organophosphates
Safety standards
TLV/MAC, 79-0346
Toxicity/non-target organisms
Crustacea, 79-0339

Temephos (cont'd)
Molluscs, 79-0586

Terbacil
see also Herbicides
Chromatography
Gas-liquid, 79-0750
Respiration, cellular
Microorganisms, 79-0216

Tetrachlorvinphos
see also Organophosphates
Residues/non-target organisms
Chicken, 79-0287
Toxicity/experimental animals
Bee, 79-0421

Thallium
see also Rodenticides
Experimental design
Toxicology and pharmacology 79-0467
Hair/fur
Animals/experimental, 79-0418
Nervous system
Human, 79-0091
Reviews
Epidemiology, prevention, and treatment, 79-0079, 79-0091
Toxicology and pharmacology 79-0091
Spectrometry
Mass spectrometry, 79-0467
Toxicity/humans
Accidental, 79-0078, 79-0086 79-0585
Intentional, 79-0086
Treatment of poisoning
Dialysis, 79-0078

Thiometon
see also Organophosphates
Bioassay, 79-0357
Peripheral nerves
Human, 79-0572
Safety standards
Toxicity rating class, 79-0357
Toxicity/experimental animals
Fish, 79-0357
Toxicity/humans
Intentional, 79-0572, 79-0610

Thiophanate-methyl
see also Fungicides
Biotransformation
Plants, 79-0432
Residues/food and feed
Wine, 79-0512
Reticuloendothelial system
Animals/experimental, 79-0700

Thiram
see also Fungicides
Digestive system
Animals/experimental, 79-0662
Enzyme activity
Mixed function oxidases, 79-0396
Liver
Animals/experimental, 79-0396
Mutagenesis/teratogenesis

Thiram (cont'd)
Animals/experimental, 79-0141
Microorganisms, 79-0428
Reproduction/growth
Animals/experimental, 79-0141

Tin compounds
see also Tributyltin; Triphenyltin
Brain
Animals/experimental, 79-0678
In vitro, 79-0678
Mitochondria
In vitro, 79-0097
Reviews
General, 79-0001
Toxicology and pharmacology 79-0097
Spectrometry
Diffraction, 79-0219
NMR, 79-0219
UV, 79-0219

Torak
see Dialifor

TOTP
see Tri-*o*-cresyl phosphate

Toxaphene
see also Organochlorines
Chromatography
Column, 79-0737
Thin-layer, 79-0250
Enzyme activity
Mixed function oxidases, 79-0396
Kidney
Animals/experimental, 79-0107
Liver
Animals/experimental, 79-0396
Prevention
Decontamination, 79-0314
Disposal, 79-0317
Residue degradation
General, 79-0317
Soil, 79-0058
Residue dynamics, 79-0058
Residues/non-target organisms
Cow, 79-0286
Toxicity/non-target organisms
Cow, 79-0286

Tri-*o*-cresyl phosphate
see also Organophosphates
Enzyme activity
Aliesterase, 79-0452
Lipids/steroids/sterols
Animals/experimental, 79-0721
Musculoskeletal system
Human, 79-0070
Nervous system
Animals/experimental, 79-0460 79-0721
Human, 79-0070, 79-0091
Polyneuritis
Animals/experimental, 79-0696
Reviews
Epidemiology, prevention, and treatment, 79-0091
Toxicology and pharmacology 79-0091

Tri-*o*-cresyl phosphate (cont'd)
Toxicity/humans
Accidental, 79-0070

Tributyltin
see also Tin compounds
Cytological effects
General, 79-0099
Respiration, cellular
General, 79-0099

Trichlorfon
see also Organophosphates
Absorption
Cow, 79-0724
Biotransformation
General, 79-0621
Animals/experimental, 79-0622
Brain
Animals/experimental, 79-0368 79-0634
Carcinogenesis
Animals/experimental, 79-0103
Enzyme activity
Glucose 6-phosphate dehydrogenase, 79-0368
Fertility/sterility
Animals/experimental, 79-0724
Gametogenesis
Animals/experimental, 79-0724
Nervous system
Human, 79-0071
Reproduction/growth
In vitro, 79-0618, 79-0619
Residues/food and feed
Animal feed, 79-0063
Fish, 79-0063
Toxicity/experimental animals
Bee, 79-0421
Mouse, 79-0103
Rat, 79-0368
Toxicity/humans
Intentional, 79-0071

Trichlormethyl
Residue degradation
Soil, 79-0292
Residue dynamics, 79-0292

Trichloronate
see also Organophosphates
Enzyme activity
Cytochrome oxidase, 79-0098
Metabolism
General, 79-0098

Trichlorophenol
see also Fungicides
Absorption
Rabbit, 79-0380
Distribution/storage
Rabbit, 79-0380

Tridemorph
see also Fungicides
Biochemical effects
Microorganisms, 79-0194

Trifenmorph
Myocardium
Animals/experimental, 79-0383

Trifenmorph (cont'd)
In vitro, 79-0383

Trifluralin
see also Herbicides
Chromatography
Gas-liquid, 79-0728
Factors influencing metabolism/toxicity
Formulation, 79-0640
Route, 79-0640
Photodecomposition, 79-0528
Residue degradation
Air, 79-0528
Residues/soil
General, 79-0511, 79-0569
Spectrometry
Mass spectrometry, 79-0728
Toxicity/experimental animals
Mouse, 79-0640

Triforine
see Fungicides

Triforine derived compounds
Photodecomposition, 79-0562
Residue degradation
In vitro, 79-0562

Triphenyltin
see also Tin compounds
Cytological effects
General, 79-0099
Respiration, cellular

Triphenyltin (cont'd)
General, 79-0099

Triton X-100
Enzyme activity
Cholinesterase, 79-0665

Vacor
see also Rodenticides
Pancreas (endocrine)
Human, 79-0588

Vamidothion
Chromatography
Gas-liquid, 79-0732

Warfarin
see also Rodenticides
Blood/body fluids
Animals/experimental, 79-0206
Excretion
Rat, 79-0422
Metabolism
Microorganisms, 79-0422
Plasma/serum
Animals/experimental, 79-0108
Toxicity/experimental animals
Quail, 79-0108
Rabbit, 79-0212
Rat, 79-0108, 79-0212
Vitamins/coenzymes
Animals/experimental, 79-0206

Xanthene dyes
Photodecomposition, 79-0259

Zineb
see also Fungicides
Digestive system
Animals/experimental, 79-0662
Enzyme activity
Carbonate dehydratase, 79-0449
Immunology
Animals/experimental, 79-0213
Residue degradation
Food and feed, 79-0054
Thyroid
Animals/experimental, 79-0213
Toxicity/non-target organisms
Fungi, 79-0074
Microorganisms, 79-0074
Vitamins/coenzymes
Animals/experimental, 79-0449

Ziram
see also Fungicides
Mutagenesis/teratogenesis
Microorganisms, 79-0428

Zolone
see Phosalon

Author Index

Abe, E., 79-0694, 79-0697, 79-0698
Abou-Donia, M. B., 79-0207, 79-0460 79-0628, 79-0718
Ackermann, H., 79-0102
Adachi, H., 79-0343
Adamczyk, E., 79-0507
Adamovic, V. M., 79-0021
Addison, J. B., 79-0043
Adeney, J. A., 79-0566, 79-0747
Agarwal, H. C., 79-0647
Agarwal, N., 79-0614
Agnihotri, N. P., 79-0277
Agrawal, T. N., 79-0390
Ahearn, M. J., 79-0327
Ahling, B., 79-0090
Airoldi, L., 79-0728
Akiyama, T., 79-0309
Albro, P., 79-0240
Aldridge, W. N., 79-0097, 79-0362
Aleksandrova, L. G., 79-0142, 79-0394
Aleksandrovna, L. G., 79-0667
Aleksay'yan, O. M., 79-0196
Alexander, M., 79-0620, 79-0683
Alexandri, A. A., 79-0512
Ali, S. L., 79-0482
Allahyari, R., 79-0186
Allegrini, I., 79-0302
Allen, J. C., 79-0026, 79-0299
Allen, J. L., 79-0239
Allen, J. R., 79-0178
Allen, R., 79-0318
Alley, E. G., 79-0319
Altmann, H. J., 79-0393
Ammann, B. D., 79-0552
Amore, F. J., 79-0546
Anders, M. W., 79-0443
Andersen, R. A., 79-0665
Andersen, R. N., 79-0297
Anderson, L. W. J., 79-0034, 79-0531
Ando, M., 79-0541
Ando, S., 79-0597
Ando, T., 79-0542
Andrade, P., 79-0475
Andres, D. R., 79-0607
Andrews, J. H., 79-0074
Angsubhakorn, S., 79-0137
Anisimova, L. A., 79-0141
Antoine, O., 79-0225
Appleton, J., 79-0162
Arai, H., 79-0664
Archer, S. R., 79-0538
Ardab'eva, T. V., 79-0651
Ardentov, N. N., 79-0080
Arendt, T., 79-0336
Arias, E., 79-0119
Arie, G., 79-0514
Arimatsu, T., 79-0598
Arjmand, M., 79-0156, 79-0472
Armstrong, J. F., 79-0266
Arsen'eva, M. V., 79-0668
Asanuma, N., 79-0543, 79-0694 79-0698
Asanuma, S., 79-0596
Atabaev, Sh. T., 79-0581
Atlas, R. M., 79-0202
Augustinsson, K. B., 79-0602, 79-0738
Aulicino, F., 79-0730
Autissier-Navarro, C., 79-0130
Avault, J. W., 79-0166
Babkina, E. I., 79-0289
Bach, F., 79-0246, 79-0450
Bach, P. H., 79-0246
Backman, L., 79-0509
Baden, D. G., 79-0627
Bagnell, P., 79-0126
Bagnell, P. C., 79-0076
Bahary, C. M., 79-0352
Bahga, H. S., 79-0409
Bahiga, L. M., 79-0218
Bai, K. M., 79-0244
Bailin, L. J., 79-0315
Bajgar, J., 79-0613
Bak, W., 79-0104
Baker, H. J., 79-0243
Bakre, P. P., 79-0448
Baksi, S. N., 79-0208
Balba, H. M., 79-0163
Balinova, A., 79-0496
Ballschmiter, K., 79-0275
Baluja, G., 79-0568
Banna, H. B., 79-0383
Bansal, O. P., 79-0223
Bansal, S. K., 79-0357, 79-0714
Baranowski, R. M., 79-0301
Barclay, K. M., 79-0320
Barmore, C., 79-0300
Barniville, G., 79-0084
Barsotti, D. A., 79-0178
Bartha, R., 79-0202
Bastide, J., 79-0023
Baumann, R., 79-0529
Bayne, B. L., 79-0135
Baynova, A. I., 79-0659
Beatty, P. W., 79-0456
Beck, S. L., 79-0640
Becker, E. L., 79-0143
Behari, J. R., 79-0387
Ben Aderet, N., 79-0580
Benes, V., 79-0521
Bengtsson, B. E., 79-0424
Bergman, A., 79-0715
Bergon, M., 79-0524
Bergstrom, N., 79-0622
Berkane, K., 79-0486
Berlin, R. D., 79-0660
Berry, D. L., 79-0177
Bestetti, G., 79-0213
Bevill, R. F., 79-0338
Beyer, J. E., 79-0175
Beyers, R. J., 79-0382
Bhamarapravati, N., 79-0137
Bhatnagar, M. C., 79-0096, 79-0346
Bhatnagar, V. K., 79-0405
Bierl, B. A., 79-0473
Biggar, J. W., 79-0308, 79-0527
Bigley, W. S., 79-0157
Bignami, M., 79-0730
Biles, R., 79-0182
Biocca, M., 79-0294
Birkmeier, J. L., 79-0582
Bitman, J., 79-0356
Bjerk, J. E., 79-0015, 79-0519
Black, J., 79-0084
Blaha, J. J., 79-0739
Blaser, W. W., 79-0224
Blattmann, P., 79-0526
Blattny, C., 79-0518
Bluethgen, A., 79-0167
Bogachuk, G. P., 79-0107
Bogdan, A., 79-0410
Bogdanov, N. A., 79-0344
Bohme, C., 79-0393
Boiko, I. B., 79-0581
Bojan, F., 79-0641
Bollag, J. M., 79-0526
Bolokhovets, M. F., 79-0212
Bonitenko, Yu, Yu., 79-0344
Bonnevie, P., 79-0209
Bontoyan, W. R., 79-0229
Borkowska, G., 79-0104
Borkowska, J., 79-0199
Borsetti, A. P., 79-0118
Bosshardt, H. P., 79-0024, 79-0048 79-0174
Bouldin, T. W., 79-0417
Bova, D. L., 79-0154, 79-0155
Bovey, R. W., 79-0257
Bowen, V. T., 79-0029
Bowmer, K. H., 79-0566, 79-0747
Bradway, D. E., 79-0573
Brady, J. L., 79-0476
Braithwaite, R. A., 79-0340
Braun, H. E., 79-0062
Brevik, E. M., 79-0015, 79-0519
Brian, R. C., 79-0252
Briggs, G. G., 79-0215
Brightwell, B. B., 79-0232
Brimfield, A. A., 79-0188
Bristol, D., 79-0537
Bristol, D. W., 79-0195, 79-0234
Brocco, D., 79-0302
Brooks, R. F., 79-0026, 79-0299
Brun, G. L., 79-0486
Bryden, C. C., 79-0652
Buchalski, L., 79-0724
Buck, N. A., 79-0551
Buck, W. B., 79-0338
Bulger, W. H., 79-0630, 79-0712
Bulkley, R. V., 79-0547
Bunyan, P. J., 79-0122
Burech, D., 79-0075
Burke, J., 79-0227
Burzynska, H., 79-0095
Buser, H. R., 79-0024, 79-0048 79-0174
Businelli, M., 79-0477
Butcher, R., 79-0600
Buznikov, G. A., 79-0165
Byczkowski, J. Z., 79-0112, 79-0638

Cachin, O., 79-0100
Cahill, W. P., 79-0269, 79-0551
Caldera, P. G., 79-0274
Caldwell, G., Jr., 79-0515
Calmon, J. P., 79-0524
Calvet, R., 79-0249
Camacho, M. E. R., 79-0576
Camper, N. D., 79-0439
Cantelmo, F. R., 79-0423
Canton, J. H., 79-0464
Capodanno, G., 79-0119
Carchman, R. A., 79-0444, 79-0708
Cardamone, G., 79-0379
Carere, A., 79-0379
Carevic, O., 79-0626
Carmody, M., 79-0084
Caro, J. H., 79-0473
Carreon, R. M., 79-0175
Carricaburu, P., 79-0655
Caserio, F. F., Jr., 79-0476
Caserio, G., 79-0032
Casida, J. E., 79-0098, 79-0189 79-0415, 79-0466
Cason, R., 79-0567
Castaing, Y., 79-0574
Cavanagh, J. B., 79-0417, 79-0418
Ceausescu, S., 79-0203
Cechowicz, R., 79-0199
Cecil, H. C., 79-0356
Cecinato, A., 79-0302
Ceglowski, W. S., 79-0372
Cerda-Olmedo, E., 79-0426
Cerna, E., 79-0053
Cerna, V., 79-0521
Chadwick, C. J., 79-0138
Chadwick, R. W., 79-0138, 79-0652
Chan, H. S., 79-0290
Chandra, D. B., 79-0390
Chasseaud, L. F., 79-0642
Chatfield, D. A., 79-0188
Chauhan, M., 79-0254
Chebotar', N. A., 79-0360
Cheng, F. P., 79-0533
Cheng, H. H., 79-0062
Chernoff, N., 79-0644
Cheung, M. W., 79-0527
Chevallier, Ch., 79-0500
Chiabrando, C., 79-0274, 79-0728
Chian, E. S. K., 79-0583
Chiba, M., 79-0237
Chipko, B. R., 79-0627
Chopra, N. M., 79-0361
Choragiewicz, H., 79-0199
Chu, K. C., 79-0674
Chubenko, A. P., 79-0525
Churchill, F. C., II, 79-0230
Cisak, E., 79-0635
Clark, E. R., 79-0555
Clark, G., 79-0180
Clark, L., 79-0068
Clark, T., 79-0051
Clothier, B., 79-0362
Cohen, S. Z., 79-0229
Colburn, W. A., 79-0679
Coleman, W. D., 79-0321
Conklin, P. J., 79-0120
Conner, B. J., 79-0295
Connor, T., 79-0182
Conti, L., 79-0730
Cook, A. M., 79-0620, 79-0683
Cooke, A. S., 79-0136
Cooke, M., 79-0481
Copeland, M. F., 79-0138, 79-0652
Corbett, M. D., 79-0627
Cornet, R., 79-0500
Coste, C., 79-0023
Cotterill, E. G., 79-0310
Cotton, D. E., 79-0281, 79-0282 79-0283
Courtney, G. F., 79-0243
Cox, D. F., 79-0033
Cripps, D. J., 79-0584
Crist, H. L., 79-0485
Cristiano, P. J., 79-0634
Crocker, J., 79-0126
Crocker, J. F. S., 79-0076, 79-0077 79-0125
Crookshank, H. R., 79-0445
Crosby, D. G., 79-0312, 79-0528
Cserhati, T., 79-0348, 79-0351
Cucos, S., 79-0514
Curtis, L. R., 79-0382, 79-0441
Cutkomp, L. K., 79-0658
Cvak, Z., 79-0053
Czeczuga, B., 79-0369
d'Allessandro De Luca, E., 79-0294
Daelemans, A., 79-0291
Dalela, R. C., 79-0096, 79-0346 79-0357, 79-0714
Darke, P. G. G., 79-0335
Das, B., 79-0681
Das, K., 79-0139
Das, V. G. K., 79-0678
Datta, H., 79-0399
Datta, K. K., 79-0387
Daughton, C. G., 79-0620, 79-0683
Daun, H., 79-0091
Dauterman, W. C., 79-0191, 79-0411
Davidek, J., 79-0518
Davidson, J. M., 79-0711
Davies, D. B., 79-0459
Davies, D. J., 79-0523
Davies, H. A., 79-0216
Davies, R. D., 79-0236
Davison, K. L., 79-0195, 79-0353 79-0358, 79-0359
Dawson, V. K., 79-0239
De Beer, J. O., 79-0493
De Jong, L. P. A., 79-0623
de la Cruz, A. A., 79-0558
De M. Barros, S. B., 79-0205
De Matteis, F., 79-0192
DeBaun, J. R., 79-0154, 79-0155
DeBeer, J., 79-0741
Decallonne, J. R., 79-0562
Dehadrai, P. V., 79-0145
Deitrich, R. A., 79-0631
Dekker, A., 79-0559, 79-0560, 79-0561
Demeterio, J. L., 79-0050
Dervieux, A. M., 79-0570
Desi, I., 79-0028
DeWalle, F. B., 79-0583
Dewan, R. S., 79-0277
Dewey, W. L., 79-0444, 79-0708
Dhaliwal, G. S., 79-0280
Dias Netto, N., 79-0513
Diaz-Colon, J. D., 79-0257
Diaz-Gil, J., 79-0710
DiGiovanni, J., 79-0177
Digout, S., 79-0126
Dikshith, T. S. S., 79-0387
Dixon, J. B., 79-0059
Dmitrienko, V. D., 79-0141
Dobolyi, C., 79-0350
Doms, D. J., 79-0235
Dorn, S. B., 79-0414
Doull, J., 79-0634
Dovzhanskii, S. I., 79-0080
Dowd, P. M., 79-0575
Down, W. H., 79-0642
Drewinko, B., 79-0327
Dustman, E. H., 79-0555
Dutta, S. K., 79-0148
Duttweiler, D. W., 79-0688
Eben, Ch., 79-0065
Ebing, W., 79-0124, 79-0190, 79-0487 79-0522
Eckert, W. R., 79-0731
Ecobichon, D. J., 79-0077
Edwards, W. M., 79-0295
Ehrnebo, M., 79-0442
Ekstedt, J., 79-0276
El Beit, I. O. D., 79-0281, 79-0282 79-0283
El-Dessoukey, E. A., 79-0218
El Sarnagawy, D., 79-0729
Ellarson, R. S., 79-0548
Elliot, J. M., 79-0062
Elmer, G. W., 79-0422
Elsohly, M. A., 79-0533
Emsley, J., 79-0086
End, D. H., 79-0708
End. D. W., 79-0444
Endo, H., 79-0544
Ercegovich, C. D., 79-0372
Eriksson, H., 79-0738
Erney, D. R., 79-0489
Ershova, K. P., 79-0740
Espinosa, Cl., 79-0500
Estesen, B. J., 79-0551
Etz, E. S., 79-0739
Etzold, R., 79-0078
Everall, J. D., 79-0575
Eyraud, J., 79-0506
Fabro, S., 79-0134
Faff, J., 79-0104
Faganeli, J., 79-0265
Fairjersson, Y., 79-0738
Faith, R. E., 79-0180
Fan, T. Y., 79-0479
Fanelli, R., 79-0274
Fangmann, G., 79-0336
Farber, E., 79-0458
Farmer, J. D., 79-0704
Farnelli, R., 79-0728
Farr, J. A., 79-0720
Farrington, J. W., 79-0029
Fat'ianova, A. D., 79-0744

Faust, H., 79-0102
Favarel Garrigues, J. Cl., 79-0574
Fawade, M. M., 79-0144, 79-0404
Feinstein, R. N., 79-0673
Ferguson, T. L., 79-0316
Ferreira, M. S., 79-0513
Feung, C. S., 79-0150
Ficsor, G., 79-0168
Figueras, M. A., 79-0710
Filenko, V. E., 79-0107
Fine, D. H., 79-0479
Finley, K. A., 79-0154
Firestone, D., 79-0227
Firlik, M., 79-0587
Fish, R. H., 79-0098
Fisher, P. R., 79-0162
Fitzgerald, G. R., 79-0084
Fitzpatrick, G., 79-0586
Flessas, E., 79-0228
Flickinger, E. L., 79-0554
Florin, J. W., 79-0068
Floru, S., 79-0262
Flugel, M., 79-0680
Fontaine, R. E., 79-0576
Forlin, L., 79-0129
Forshaw, P., 79-0362
Fox, L. L., 79-0285
Fraczek, S., 79-0736
Frank, A. M., 79-0339
Frank, R., 79-0062
Franklin, C. A., 79-0649
Fravel, H. G., 79-0224
Frazier, L., 79-0515
Freal, J. J., 79-0652
Frear, D. S., 79-0670
Fredrickson, A. S., 79-0342
Freeman, H. P., 79-0473
Freimane, T. Kh., 79-0132
Friesen, M. D., 79-0241
Fritsche, W., 79-0722
Frolov, B. A., 79-0287
Fry, R. J. M., 79-0673
Fry, S. M., 79-0168
Fuchsbichler, G., 79-0065
Fuhr, F., 79-0242
Fuhremann, T. W., 79-0151, 79-0260
Fujihara, S., 79-0343
Fukuto, T. R., 79-0186, 79-0413 79-0706
Furr, A. A., 79-0286
Furukawa, T., 79-0089
Fusek, J., 79-0613
Futrell, J., 79-0188
Gadoth, N., 79-0323
Galdhar, N. R., 79-0404
Gale, G. T., Jr., 79-0569
Gamble, E., 79-0029
Gandawidjaja, L., 79-0106
Gantz, G., 79-0506
Garattini, S., 79-0274
Garg, M., 79-0146
Garszel, J., 79-0198
Gaughan, L. C., 79-0415
Gaur, A. C., 79-0311
Gavrichenko, A. I., 79-0288
Gehring, P. J., 79-0175, 79-0181
Geike, F., 79-0645, 79-0646
Geldmacher-von Mallinckrodt, M. 79-0680
Gembitskii, E. V., 79-0344
Geoga, D., 79-0506
Ghataka, S., 79-0251
Giam, C. S., 79-0290
Giang, P. A., 79-0220
Gibbs, C., 79-0335
Gierasimow, M., 79-0369
Gilbert, M., 79-0018
Girard, P. R., 79-0461
Giri, S. N., 79-0713
Gitlitz, M. H., 79-0001
Glass, R., 79-0067
Glickman, A., 79-0491
Glotfelty, D. W., 79-0044
Glukhova, L. G., 79-0661
Glushkova, N. A., 79-0140
Gocmen, A., 79-0584
Goga, E., 79-0262, 79-0512
Goldberg, E. D., 79-0029
Golder, T. K., 79-0677
Gonczi, Cs., 79-0028
Goodwin, N., 79-0450
Gordts, L., 79-0748
Gorski, M., 79-0618, 79-0619
Gosalvez, M., 79-0710
Goto, S., 79-0435, 79-0497, 79-0498
Gough, H. C., 79-0354
Graham, D. G., 79-0460, 79-0718
Grahneis, H., 79-0052, 79-0250
Grantham, L. F., 79-0320
Gratz, N. G., 79-0505
Graves, J. B., 79-0166
Grebenik, L. A., 79-0360
Grechkina, V. D., 79-0511
Gredt, M., 79-0194
Greenberg, D. B., 79-0657
Gregson, M., 79-0418
Greichus, Y. A., 79-0552
Grorud, R. B., 79-0490
Grover, R., 79-0238, 79-0284
Grundule, M. V., 79-0132
Grunow, W., 79-0393
Grzybek, D., 79-0619
Guczi, L., 79-0314
Gueck, B. D., 79-0552
Guerra, H. M., 79-0476
Guiney, P. D., 79-0453
Gunner, H. B., 79-0049
Gupta, A. K., 79-0714
Gupta, P. K., 79-0387, 79-0442
Guthrie, F. E., 79-0707
Guttowa, A., 79-0465
Haefner, M., 79-0016
Hague, A., 79-0522
Halberg, F., 79-0658
Halde, U. K., 79-0404
Hale, K. A., 79-0072
Hamada, N., 79-0131
Hamann, J., 79-0167
Hamill, A. S., 79-0041
Hamilton, R. H., 79-0150, 79-0156
Hammock, B. D., 79-0412
Hamon, J., 79-0505
Hamparian, V. V., 79-0075
Hance, R. J., 79-0310
Hanifi, H. S., 79-0403
Hanonouchi, M., 79-0664
Hansen, L. G., 79-0414
Hanusch, A., 79-0611, 79-0611
Hara, M., 79-0427
Hardwick, D. F., 79-0127
Harker, L. A., 79-0578
Harman, P. D., 79-0160, 79-0239
Harris, C. R., 79-0038
Harris, S. J., 79-0356
Harvey, G., 79-0029
Hass, J. R., 79-0241
Hattula, M., 79-0267
Hattula, M. L., 79-0556
Haulsee, R. E., 79-0582
Hauschild, F., 79-0103
Hawkins, R. K., 79-0197
Hay, A., 79-0011, 79-0256
Hayashi, S., 79-0544
Hayes, W. J. Jr., 79-0329
Hebb, E. A., 79-0532
Heeschen, W., 79-0167
Heesen, T. C., 79-0571
Heidemanis, K. K., 79-0132
Heiderscheit, L. T., 79-0704
Heitz, J. R., 79-0259
Helfant, L. J., 79-0494
Helling, C. S., 79-0036, 79-0159
Helmeczi, B., 79-0347
Hemer, M., 79-0030
Henmi, R., 79-0429, 79-0430
Henzlerova, H., 79-0518
Herin, R. A., 79-0704
Heritage, J., 79-0081
Herman, K., 79-0641
Hernandez, L. M., 79-0568
Hernandez, R., 79-0341
Hertel, B., 79-0433
Hertzler, B. L., 79-0315
Hettwer, H., 79-0106
Heyndrickx, A., 79-0741
Heyndrickx, A. M., 79-0493
Hiernaux, G., 79-0748
Hierons, R., 79-0071
Hildebrand, H. H., 79-0554
Hilton-Brown, P., 79-0602
Himes, R. H., 79-0633
Hinton, D. E., 79-0684
Hirabayashi, H., 79-0596
Hirai, K., 79-0695
Hirano, M., 79-0435
Hirosawa, H., 79-0391
Hirose, A., 79-0222
Hirose, M., 79-0664
Hoeglund, L., 79-0715
Hoffmann, O. L., 79-0005
Hogue, E. J., 79-0164
Holdrinet, M., 79-0062
Holdrinet, M. V. H., 79-0577
Hollo, A., 79-0028
Holloman, M. E., 79-0317
Holman, G. M., 79-0445
Holmes, P. A., 79-0176

Holmstedt, B., 79-0602, 79-0621 79-0622
Holson, J. F., 79-0676
Holt, T. M., 79-0197
Holub, B. J., 79-0459
Homma, K., 79-0434
Hong, S. K., 79-0461
Honjuku, H., 79-0699
Hooten, E. C., 79-0416
Hopkins, F. C., 79-0316
Horiguchi, Y., 79-0694, 79-0698
Horiuchi, N., 79-0597
Hornish, R. E., 79-0153
Horvath, L., 79-0349
Hoshijima, K., 79-0699
Hoshino, M., 79-0183, 79-0690 79-0692
Houx, N. W. H., 79-0559, 79-0561
Houx, W. H., 79-0560
Howse, H. D., 79-0324
Huang, C. C., 79-0121
Huddart, H., 79-0381
Hughes, D. L., 79-0555
Hughes, J. H., 79-0075
Hulth, L., 79-0715
Hunt, D. F., 79-0725
Hurkat, P. C., 79-0147, 79-0397
Hutson, D. H., 79-0466
Hutto, F. Y., 79-0317
Hwang, E. C., 79-0689
Ide, H., 79-0596
Iida, K., 79-0245
Ikeda, H., 79-0245
Il'ina, V. A., 79-0581
Illarionov, A. I., 79-0421
Imai, H., 79-0389
Inami, S., 79-0585
Inoue, S., 79-0089
Ioannou, Y. M., 79-0191
Ionita, E., 79-0203
Ippen, H., 79-0101
Irwin, R. D., 79-0263
Irwin, W. J., 79-0726
Isac, M., 79-0262
Iseng, C. K., 79-0155
Ishikawa, S., 79-0333, 79-0389, 79-0391
Ishizuka, K., 79-0292
Ismail, R. M., 79-0380
Israeli, R., 79-0580
Isshiki, K., 79-0499
Istamov, Kh. I., 79-0666
Ito, N., 79-0664
Ivanitskii, V. A., 79-0214
Ivey, M. C., 79-0416
Iwan, J., 79-0433
Izumiyama, T., 79-0590, 79-0594
Jackson, J. W., 79-0742
Jackson, T., 79-0342
Jager, K. W., 79-0006
Jagiello-Wojtowicz, E., 79-0105
Jain, H. K., 79-0277
Jan, J., 79-0265
Janatuinen, J., 79-0267, 79-0556
Janke, D., 79-0722
Janos, E., 79-0351
Jarv, J., 79-0632
Jarvis, W. R., 79-0271
Jasmine, I., 79-0401
Jastroch, S., 79-0345
Jayapragasam, M., 79-0401
Jefferies, D. J., 79-0705
Jenkins, D., 79-0308
Johansson, C. E., 79-0305, 79-0746
Johnson, M. K., 79-0071, 79-0362 79-0625
Johnson, T. M., 79-0557
Johnston, D. W., 79-0553
Jolly, A. L., 79-0166
Jordan, L., 79-0719
Josephi, K. J., 79-0501
Joshi, G. P., 79-0576
Jovanovic-Smilganski, M., 79-0021
Jowett, P. E., 79-0135
Joy, P. J., 79-0501
Juchau, M. R., 79-0177
Juhnke, I., 79-0723
Jurek, A., 79-0200
Jurkiewicz, G., 79-0368
Jusic, A., 79-0572
Kachole, M. S., 79-0116, 79-0403
Kacperczyk, J., 79-0724
Kada, T., 79-0427, 79-0428
Kagan, Y. S., 79-0102
Kagan, Yu. S., 79-0373, 79-0374
Kahn, E., 79-0067
Kalinowska, Z. E., 79-0365
Kaloyanova, F. P., 79-0659
Kalra, R. L., 79-0280
Kamaldeep, K., 79-0636
Kamata, K., 79-0590, 79-0594
Kan, C. A., 79-0149
Kanazawa, J., 79-0643
Kaneda, M., 79-0429, 79-0430
Kaneko, H., 79-0293
Kaniewska-prus, M., 79-0446
Kaphalia, B. S., 79-0406
Kapoor, I. P., 79-0671
Kapur, K., 79-0636
Kar, S., 79-0650
Karam, J. H., 79-0588
Karel, A. K., 79-0392
Katan, J., 79-0260
Kathpal, T. S., 79-0031, 79-0279
Kato, K., 79-0428, 79-0429
Kato, M., 79-0703
Kato, N., 79-0703
Kato, S., 79-0172
Kato, Y., 79-0435
Kaufman, D. D., 79-0158
Kaufman, H., 79-0352
Kavadia, V. S., 79-0279
Kawai, M., 79-0696
Kawanishi, A., 79-0543
Kecskes, M., 79-0348, 79-0350
Keefe, T. J., 79-0066
Kelly, D. F., 79-0335
Kelson, G. L., 79-0316
Kenega, E. E., 79-0388
Kenerly, C. M., 79-0074
Kennedy, M. V., 79-0317
Kerr, L. A., 79-0238
Kesado, K., 79-0598
Keyes, D. G., 79-0175
Khan, F. A., 79-0400
Khan, S., 79-0223
Khan, S. U., 79-0042
Khanna, R. N., 79-0402
Kharchenko, S. M., 79-0536
Khasawinah, A. M. A., 79-0706
Khera, K. S., 79-0454
Khinkova, L. S., 79-0395
Khristeva, V. V., 79-0395
Khromov-Borisov, N. V., 79-0165
Kida, K., 79-0595
Kikuchi, Y., 79-0589
Kilgore, W., 79-0019
Kim, G., 79-0193
Kimbrough, R. D., 79-0716
Kimmel, E. C., 79-0098
Kimura, T., 79-0703
Kinebuchi, H., 79-0184, 79-0457
King, K. A., 79-0554
King, R. R., 79-0478
Kirilenko, A. I., 79-0360
Kirkpatrick, R. L., 79-0462
Kissel, C. L., 79-0476
Kitamura, M., 79-0539
Kitchin, K. T., 79-0425
Klein, S. A., 79-0308
Klein, W., 79-0040
Kleinrok, Z., 79-0105
Klekowski, R. Z., 79-0446
Klimek, K., 79-0199
Klisenko, M. A., 79-0394, 79-0667
Knaak, J., 79-0019
Knaak, J. B., 79-0342
Knackmus, H. J., 79-0364
Knausenberger, W. I., 79-0469
Knoll, W., 79-0345
Kobayashi, H., 79-0497
Kobayashi, S., 79-0273, 79-0590 79-0594
Kocher, C. W., 79-0224
Kociba, R. J., 79-0175
Kofanov, V. I., 79-0749
Kofman, I. Sh., 79-0749
Koga, M., 79-0735
Kohda, H., 79-0436
Kohli, J., 79-0040
Kohli, K. K., 79-0123
Kokshareva, N. V., 79-0373, 79-0374
Kolaja, G. J., 79-0684
Kolmodin-Hedman, B., 79-0509 79-0602
Komarova, N. S., 79-0740
Konno, N., 79-0184, 79-0457
Kontson, A., 79-0017
Konyukhov, A. F., 79-0375
Koonce, K. L., 79-0166
Korablev, M. V., 79-0662
Korak, E., 79-0521
Koransky, W., 79-0101
Korde, B., 79-0446
Korte, F., 79-0040, 79-0380
Koschier, F. J., 79-0461
Kosinova, N. R., 79-0196
Koss, G., 79-0101
Kossmann, U., 79-0124

Koster, P. B., 79-0060
Kotake, K., 79-0183, 79-0690, 79-0693
Kotb, N. A., 79-0218
Koundinya, P. R., 79-0408
Kovtun, S. D., 79-0373, 79-0374
Koyama, T., 79-0517
Koza, E. P., 79-0143
Koziz, M. B., 79-0663
Kozler, M., 79-0088
Kranich, W. L., 79-0314
Krasnykh, A. A., 79-0495
Krause, G. H. M., 79-0047
Krause, R. T., 79-0475
Krawiec, J. A., 79-0660
Krebs, C. T., 79-0579
Kreeftenberg, J. G., 79-0170
Krienke, E. G., 79-0078
Krishnaiah, K., 79-0278
Krishnakumari, M. K., 79-0244
Krishnamurthy, K. K., 79-0296
Krivonak, A. E., 79-0036, 79-0159
Kruizinga, W., 79-0170
Ku, C. C., 79-0671
Ku, D. N., 79-0230
Kubena, L., 79-0445
Kudo, Y., 79-0700
Kudryashova, N. I., 79-0165
Kuemmerle, F., 79-0204
Kuhr, R. J., 79-0516
Kullmann, R., 79-0624
Kumagaya, S., 79-0610
Kumura, Y., 79-0593
Kupfer, D., 79-0630, 79-0712
Kurokawa, T., 79-0438
Kurosawa, K., 79-0694, 79-0697 79-0698
Kurotani, S., 79-0590
Kurozumi, A., 79-0438
Kurtz, D., 79-0549
Kusakabe, K., 79-0603
Kusunoki, F., 79-0593
Kuz'minskaya, U. A., 79-0396
Kuz'minskaya, Y. A., 79-0214
Kveseth, N. J., 79-0519
Kyprianou, P., 79-0108
Laanio, T., 79-0526
Lacroix, J., 79-0655
Lacroix, R., 79-0655
Lafleur, K. S., 79-0569
Lakatos, E., 79-0349
Lambrecht, L. K., 79-0178
Lamparski, L. L., 79-0231, 79-0483
Landa, E. A., 79-0056
Lange, B., 79-0345
Langel, U., 79-0632
Langner, H. J., 79-0228
LaPierre, R. B., 79-0314
LaRocca, S. A., 79-0582
Larsson, B., 79-0363
Last, J. A., 79-0657
Latalski, M., 79-0111
Latheef, M. A., 79-0263
Latuszynska, J., 79-0635
Law, M., 79-0229
Lawless, E. W., 79-0316
Lawrence, J. F., 79-0484
Layton, B. R., 79-0319
Leary, W. P., 79-0246
Leatherland, J. F., 79-0577
Lech, J. J., 79-0491
Lee, C. C., 79-0717
Lee, G. F., 79-0273
Lee, P. W., 79-0186
Lee, S., 79-0126
Lee, S. H. S., 79-0125
Lefebvre-Drouet, E., 79-0249
Legator, M., 79-0128, 79-0182
Lehmann, W. D., 79-0467
Leiba, S., 79-0352
Leistra, M., 79-0559, 79-0560, 79-0561
Lembas, J., 79-0470
Lenner, V., 79-0204
Leoni, V., 79-0294
Leoniak-Steinbrich, K., 79-0709
Leroux, P., 79-0194
Leshchev, V. V., 79-0287
Lewis, C. C., 79-0263
Lewis, R., 79-0113
LeWitt, P. A., 79-0588
Liberti, A., 79-0302
Lichtenstein, E. P., 79-0037, 79-0151 79-0260
Lidman, U., 79-0129
Limouzin, Y., 79-0219
Lindahl, R., 79-0631
Lindskog, A., 79-0090
Lisk, D. J., 79-0018
Litsinger, J. A., 79-0502
Livesey, J. C., 79-0443
Lockwood, J. L., 79-0376
Loeffler, R. S. T., 79-0563
Loerch, S. L., 79-0150
Lohse, C., 79-0061
Lores, E. M., 79-0234, 79-0573 79-0704
Lott, J. W., 79-0235
Lott, P. F., 79-0235
Love, R., 79-0342
Lucier, G. W., 79-0179, 79-0378
Lue, K. Y., 79-0558
Luedemann, D., 79-0723
Lund, S. A., 79-0286
Lundy, P. M., 79-0355, 79-0377
Luppi, G., 79-0032
Luster, M. I., 79-0180
Lutz, W. K., 79-0629
Lye, T. L., 79-0386
Lyness, R., 79-0067
MacDonald, R. N., 79-0486
Macdonald, S. R., 79-0268
Machin, A. F., 79-0606
Maciejska, K., 79-0095
Mackrell, J. A., 79-0669
Maddy, K., 79-0019
Maddy, K. T., 79-0342, 79-0608
Mader, M. R., 79-0615
Magor, G., 79-0355
Magos, L., 79-0455
Maguri, M., 79-0593
Mahfouz, A. M., 79-0361
Mahle, N. H., 79-0231
Mahmood, A., 79-0614
Mahon, D. C., 79-0127
Maire, J. C., 79-0219
Majewski, M., 79-0104
Majumder, S. K., 79-0244
Makhija, S. J., 79-0403
Maki, S., 79-0437
Malakhov, S. G., 79-0688
Malen'kii, V. P., 79-0093
Malik, J. M., 79-0232
Mallet, V. N., 79-0486
Malnersic, S., 79-0265
Malviya, A. N., 79-0405
Mamma, R. O., 79-0150
Manis, J., 79-0193
Mansager, E. R., 79-0670
Mansour, M., 79-0529
Manukhin, B. N., 79-0165
Marby, D. R., 79-0321
March, R. B., 79-0706
Marriage, P. B., 79-0041
Marsh, J. A. P., 79-0216
Marshall, L. E., 79-0633
Martin, D. H., 79-0113
Martin, J. H., 79-0029
Marucchini, C., 79-0477
Maruyama, K., 79-0089
Marvel, J. T., 79-0232
Mast, T., 79-0528
Masui, T., 79-0590, 79-0594
Matano, G., 79-0497
Matano, O., 79-0435
Matayoshi, Y., 79-0610
Mathur, D. S., 79-0201
Mathur, S. P., 79-0020
Matsubara, S., 79-0054
Matsuda, H., 79-0540
Matsumara, F., 79-0264
Matsushima, S., 79-0697
Matsushita, T., 79-0592
Matthews, H. B., 79-0172
Matysek, W., 79-0635
Maybank, J., 79-0284
Mayfield, C. I., 79-0463
McAvoy, H., 79-0546
McCaskill, W. R., 79-0569
McClure, C. D., 79-0601
McConnell, E. E., 79-0173, 79-0612
McCornack, A. A., 79-0298
McCurley, W. R., 79-0538
McEvoy, D., 79-0325
McKague, A. B., 79-0114
McKinney, J., 79-0227
McLane, M. A. R., 79-0555
McLeod, J. M., 79-0025
McNeil, J., 79-0025
Meallier, P., 79-0023
Medd, R. K., 79-0340
Medvedev, B. M., 79-0373, 79-0374
Mees, G., 79-0225
Mehendale, H. M., 79-0133, 79-0441
Meiners, A. F., 79-0316
Meiniel, R., 79-0130, 79-0217
Melchlor, V. E., 79-0263
Meleney, W. P., 79-0419
Mendelssohn, H., 79-0326
Mengle, D., 79-0067

Menn, J. J., 79-0154, 79-0155
Merchan, J., 79-0710
Merrill, E. W., 79-0321
Mes, J., 79-0523
Mestres, R., 79-0500
Meyer, J. A., 79-0562
Meyer, P., 79-0094
Mihanovic, B., 79-0432
Mihara, K., 79-0436
Mikalsen, A., 79-0665
Mikami, N., 79-0436
Miles, J. R. W., 79-0038
Miles, J. W., 79-0230
Milic, S., 79-0572
Miller, H., 79-0514
Milman, H. A., 79-0674
Milosevic, M. P., 79-0672
Mingelgrin, U., 79-0304
Mingelgrin, V., 79-0527
Minor, J. L., 79-0717
Mirra, A. P., 79-0514
Misato, T., 79-0438
Misra, D., 79-0402
Misra, K. C., 79-0311
Mitchell, R. H., 79-0022
Mitra, P. K., 79-0409
Mitsuo, T., 79-0539
Miura, T., 79-0517
Miyamoto, J., 79-0293, 79-0436
Miyata, M., 79-0389, 79-0391
Miyazawa, E., 79-0183, 79-0690 79-0691
Mizyukova, I. G., 79-0373, 79-0374
Moccia, R. D., 79-0577
Moeller, L., 79-0715
Mohanty-Hejmadi, P., 79-0148
Moilanen, K. W., 79-0528
Momose, T., 79-0183
Moody, K., 79-0502
Moons, C., 79-0562
Moore, J. A., 79-0171, 79-0612
Moore, S., III, 79-0546
Moran, E. T., Jr., 79-0370
Mordaleva, L. G., 79-0511
Morgan, D. G., 79-0335
Morgan, D. P., 79-0069
Morgan, J. P., 79-0070
Mori, H., 79-0599
Mori, K., 79-0540
Morison, R., 79-0445
Moriya, M., 79-0428, 79-0429
Morley, H. V., 79-0020
Morpurgo, G., 79-0379, 79-0730
Morschel, E., 79-0371
Mosekilde, L., 79-0605
Moseman, R. F., 79-0234, 79-0485 79-0573
Moser, F., 79-0733
Moser, R., 79-0732
Most, B. M., 79-0068
Motojuku, H., 79-0599
Motoyama, N., 79-0411
Mourer, C., 79-0019
Mourik, J., 79-0623
Moye, H. A., 79-0298, 79-0300
Muccitelli, R. M., 79-0630, 79-0712
Muehlendahl, K. E., 79-0078
Mukada, T., 79-0604
Mukherjee, R. N., 79-0009
Mukhopadhyay, P. K., 79-0145
Mull, R., 79-0019
Mull, R. L., 79-0675
Mumma, R. O., 79-0156
Munro, I. B., 79-0606
Murado, M. A., 79-0568
Murasaki, G., 79-0664
Murphy, S. D., 79-0452
Murthy, N. B. K., 79-0158
Mustafa, H. T., 79-0515
Nagai, K., 79-0610
Nagata, H., 79-0590, 79-0594
Nagy, A., 79-0641
Nakahara, T., 79-0292
Nakamura, H., 79-0343
Nakamura, I., 79-0517, 79-0700
Nakamura, S., 79-0596
Nakano, A., 79-0542
Namba, H., 79-0690
Nappier, J. L., 79-0153
Narahashi, T., 79-0185
Narain, N. K., 79-0263
Narita, S., 79-0599, 79-0699
Naruse, K., 79-0089
Navarro, M. A., 79-0710
Nazarov, S. S., 79-0421
Neal, R. A., 79-0456, 79-0719
Neff, G. S., 79-0290
Negishi, K., 79-0603
Nelson, C. J., 79-0676
Nelson, H. A., 79-0286
Nelson, S. R., 79-0634
Nestrick, T. J., 79-0483
Nev, H. J., 79-0275
Newhouse, M., 79-0325
Newsome, W. H., 79-0474, 79-0649
Ng, M. L., 79-0678
Nickless, G., 79-0481
Nieberg, P. S., 79-0677
Nigg, H. N., 79-0004, 79-0026, 79-0027 79-0299, 79-0447
Nisbet, I. C. T., 79-0007, 79-0341
Nishibe, T., 79-0682
Nishida, N., 79-0700
Nishimura, K., 79-0185
Nishiyama, K., 79-0595
Nogueira, D. P., 79-0514
Nomura, S., 79-0592
Noor, A., 79-0279
Nordgren, I., 79-0621, 79-0622
Nose, K., 79-0303
Nose, N., 79-0222
Nury, J., 79-0023
O'Dwyer, W. F., 79-0084
Oberacker, D. A., 79-0315
Obrusiewicz, K., 79-0367
Ocampo, L., 79-0675
Ochomogo, O. R., 79-0272
Oden, S., 79-0276
Oehme, F. W., 79-0206
Oguri, M., 79-0603
Ohkawa, H., 79-0293
Ohsawa, M., 79-0089
Oikawa, K., 79-0696
Okada, T., 79-0054
Okuda, T., 79-0695
Okudera, F., 79-0183
Okudera, H., 79-0183
Okun'kov, P. S., 79-0092
Oledzka, R., 79-0198
Oliver, J. E., 79-0017
Oliver, J. M., 79-0660
Oloffs, P. C., 79-0127
Olson, B., 79-0557
Olszyna-Marzys, A. E., 79-0258
Onikienko, F. A., 79-0142
Onji, Y., 79-0054
Orkin, V. F., 79-0080
Ortali, V. A., 79-0379
Osheim, D. L., 79-0286
Oskarsson, A., 79-0363
Osteryoung, J. G., 79-0727
Ostler, D. C., 79-0606
Ostrouhkova, V. A., 79-0142
Osweiler, G. D., 79-0337
Ou, L. T., 79-0711
Overstreet, R. M., 79-0324
Ozere, R. L., 79-0076
Paasivirta, J., 79-0267, 79-0556
Padalkin, I. Ya., 79-0210
Pallisgaard, G., 79-0605
Palmer, J. S., 79-0416
Palokangas, R., 79-0556
Pandey, S. Y., 79-0277
Panizzi, A., 79-0032
Parasher, C. D., 79-0646
Pardhan, G. D., 79-0576
Paris, D. F., 79-0306, 79-0307
Parizek, J., 79-0504
Parker, P. L., 79-0029
Parker, V. H., 79-0362
Parks, M., 79-0331
Parlar, H., 79-0529
Pasztor, Zs., 79-0028
Patocka, J., 79-0613
Patrick, R. S., 79-0109
Patumi, M., 79-0477
Pau, J. K., 79-0476
Pawar, S. S., 79-0116, 79-0144, 79-0403 79-0404
Payne, D., 79-0576
Paz, U., 79-0326
Peakall, D. B., 79-0550
Pearce, P. A., 79-0550
Pearson, H., 79-0335
Pearson, J. A., 79-0576
Pearson, M. L., 79-0491
Pedersen, C. L., 79-0061
Pellerin, D., 79-0100
Pemberton, J. M., 79-0162
Penumarthy, L., 79-0206
Penvich, P., 79-0070
Peoples, S. A., 79-0342, 79-0608 79-0675, 79-0713
Percich, J. A., 79-0376
Peristianis, G. C., 79-0455
Peters, H. A., 79-0584
Peterson, R. E., 79-0131, 79-0453
Peterson, S. R., 79-0548

Petro, N. P., 79-0534
Pflugmacher, J., 79-0487
Pigati, P., 79-0513
Pilenkova, I. I., 79-0744
Pillai, M. K. K., 79-0647
Piotrowska, A., 79-0618
Pittman, K. A., 79-0152
Plapp, F. W., Jr., 79-0157
Plimmer, J. R., 79-0313
Plummer, J. M., 79-0383
Podlejski, J., 79-0570
Pollack, J. D., 79-0075
Polzhofer, K., 79-0750
Pomerantz, I., 79-0227
Poole, A., 79-0341
Popp, J. A., 79-0458
Portier, K. M., 79-0068
Possanzini, M., 79-0302
Potashnik, G., 79-0580
Pouyet, B., 79-0023
Powell, K., 79-0067
Powell, M. L., 79-0422
Pozsar, B. I., 79-0349
Pramer, D., 79-0202
Prasad, V. G., 79-0278
Prather, D., 79-0704
Prescott, A. M., 79-0481
Pretorius, V., 79-0236
Price, R. J., 79-0362
Pridmore, R. B., 79-0114
Pringle, J. C., 79-0531
Pringle, J. C., Jr., 79-0034
Prosser, P. R., 79-0588
Przylepa, E., 79-0635
Pueyo, C., 79-0426
Puleston, D., 79-0341
Pull, J. H., 79-0576
Quick, M. P., 79-0606
Rabloczky, G., 79-0615
Radhakrishnumurty, R., 79-0407
Radosevich, S. R., 79-0520
Radzuweit, J., 79-0433
Ragab, M. T. H., 79-0226
Raguraj, R., 79-0296
Raines, R. W., 79-0034, 79-0531
Rajukannu, V., 79-0401
Rajukkannu, K., 79-0296
Rakhmatov, U. A., 79-0211
Rakich, L., 79-0165
Ramachandran, B. V., 79-0398, 79-0734 79-0743
Ramakrishna, N., 79-0398, 79-0734 79-0743
Ramamurthi, R., 79-0408
Rane, P. D., 79-0201
Rao, K. R., 79-0120, 79-0423
Rappaport, R., 79-0100
Rappe, C., 79-0024, 79-0174
Rawlings, G. D., 79-0538
Reed, L. W., 79-0567
Rees, W. D., 79-0122
Reif, H., 79-0733
Reineke, W., 79-0364
Reinhart, B. S., 79-0370
Reiser, K. M., 79-0657
Renner, G., 79-0653, 79-0654
Repetto, M., 79-0468
Reuber, M. D., 79-0451
Reuppel, M. L., 79-0232
Reynold, L. M., 79-0550
Rhead, M. M., 79-0135
Rho, J., 79-0049
Rhodes, M. L., 79-0656
Ribas, C., 79-0513
Richards, D. M. T., 79-0330
Richerson, H. B., 79-0110
Richter, W. R., 79-0176
Rickard, R. W., 79-0439
Riemer, F., 79-0345
Rihan, T. I., 79-0515
Riner, J. C., 79-0233
Rinkus, S., 79-0128
Ripley, B. D., 79-0033
Risebrough, R. W., 79-0029, 79-0341
Rizk, A. S., 79-0729
Roach, J., 79-0227
Roach, J. A. G., 79-0118
Roberts, D. J., 79-0481
Roberts, I. H., 79-0419
Roberts, M. G., 79-0565
Robertson, W., 79-0029
Robinson, A. S., 79-0002
Robinson, E., 79-0285
Robinson, K. D., 79-0384
Robinson, K. M., 79-0187
Robinson, R. A., 79-0415
Rockie, B. A., 79-0476
Rodriguez-Vazquez, J. A., 79-0247
Rogers, C. J., 79-0318
Romanovskaya, O. I., 79-0261
Romanowski, H., 79-0616, 79-0617
Romruen, K., 79-0137
Roper, M., 79-0631
Rosasco, G. J., 79-0739
Rosen, J. D., 79-0671
Rosenstein, L., 79-0644
Rosenthal, D., 79-0325
Rosival, L., 79-0006
Ross, P. F., 79-0286
Ross, R. G., 79-0270
Rothwell, D. F., 79-0711
Rouchaud, J., 79-0562
Rourke, D. R., 79-0152
Rozee, K., 79-0126
Rozee, K. R., 79-0125
Ruiz-Vazquez, R., 79-0426
Rust, J. H., 79-0176
Ryzhaya, M. A., 79-0535
Rzeszowska, G., 79-0111
Sackett, R. R., 79-0386
Sadaie, Y., 79-0427
Safe, S., 79-0126
Safe, S. K., 79-0125
Sagredos, A. N., 79-0731, 79-0732
Saha, J. G., 79-0163
Sahai, R., 79-0253
Sahaphong, S., 79-0137
Saito, M., 79-0590
Saito, S., 79-0183, 79-0690
Sakula, A., 79-0600
Sakurai, K., 79-0596
Saliba, A. M., 79-0205
Salminen, L., 79-0380
Salmona, M., 79-0274
Saltzman, S., 79-0304
Samson, F. E., 79-0634
Sandoz, M., 79-0621, 79-0622
Sanwald, E., 79-0013
Sanyal, S., 79-0614
Sanz, P., 79-0468
Sarkka, J., 79-0267, 79-0556
Sarna, L. P., 79-0268
Sasaki, K., 79-0694, 79-0697, 79-0698
Sasaki, S., 79-0544
Sasano, N., 79-0604
Sastry, K. V., 79-0637, 79-0648
Sato, J., 79-0599, 79-0699
Sato, K., 79-0435, 79-0437, 79-0604
Savage, E. P., 79-0066
Saxena, P. K., 79-0146
Saxena, S. C., 79-0448
Schabas, W., 79-0508
Schein, L. G., 79-0385
Scheunert, I., 79-0040
Schiller, C. M., 79-0378
Schlatter, C., 79-0629
Schlueter, H., 79-0115
Schneider, E., 79-0029
Schnitzer, M., 79-0042
Schulten, H. R., 79-0467
Schultz, D. P., 79-0160, 79-0239
Schulz, R. B., 79-0321
Schuphan, I., 79-0124, 79-0190, 79-0522
Schuster, K. P., 79-0653, 79-0654
Schweisguth, O., 79-0100
Seiber, J. N., 79-0528
Seidenfeld, J. J., 79-0110
Seifert, J., 79-0518
Seifter, J., 79-0717
Sell, J. L., 79-0195, 79-0359
Selwyn, M. J., 79-0099
Semeluk, G. P., 79-0043
Semonian, B. P., 79-0471
Serafin, B., 79-0104
Service, M. W., 79-0008
Seth, T. D., 79-0406
Sethi, S. K., 79-0725
Sethunathan, N., 79-0035, 79-0057
Seubert, A., 79-0101
Seubert, S., 79-0101
Seymour, J. L., 79-0453
Shabalina, L. P., 79-0079
Shadoff, L. A., 79-0224, 79-0231
Shah, P. V., 79-0707
Shanker, A., 79-0031
Shapkin, V. I., 79-0344
Sharma, R. P., 79-0181
Sharma, S. K., 79-0637, 79-0648
Shaw, R. K., 79-0355
Shea, P. J., 79-0328
Shefner, A. M., 79-0176
Shiaku, K., 79-0695
Shibata, H., 79-0514
Shimamoto, T., 79-0540
Shingu, A., 79-0429, 79-0430
Shinozuka, H., 79-0458
Shirai, T., 79-0664

Shirasu, Y., 79-0427, 79-0428, 79-0429 79-0430, 79-0435
Shitukhina, A. F., 79-0740
Shono, T., 79-0189
Short, R. D., 79-0717
Shrivastava, B. P., 79-0031
Shvets, D. A., 79-0495
Shy, C. M., 79-0068
Siebering, H., 79-0291
Siegel. D. M., 79-0713
Sieklucka-Dziuba, M., 79-0105
Sigman, M., 79-0143
Sijpesteijn, A. K., 79-0432
Silke, B., 79-0084
Silver, E. H., 79-0452
Simonet, D. E., 79-0469
Sinell, H. J., 79-0228
Singh, B. D., 79-0139
Singh, J., 79-0139
Singh, P. K., 79-0650, 79-0681
Singh, R. B., 79-0139
Singh, R. M., 79-0139
Singhal, J. P., 79-0223
Sirianni, S. R., 79-0121
Sisneros, D. A., 79-0531
Siverina, A. A., 79-0289
Sjogren, R. D., 79-0339
Skalska, E., 79-0367
Skelly, N. E., 79-0490
Skilleter, D. N., 79-0362
Skuryatin, M. O., 79-0536
Slack, J. A., 79-0726
Slaga, T. J., 79-0177
Slichter, S. J., 79-0578
Smalley, H. E., 79-0445
Smelt, J. H., 79-0559, 79-0560, 79-0561
Smith, A. E., 79-0215
Smith, D. R., 79-0108
Smith, E. A., 79-0463
Smith, P. D., 79-0310
Smith, S., 79-0058, 79-0480
Smoliar, L. S., 79-0661
Smyth, M. R., 79-0727
Snowden, R. T., 79-0455
Sober, I., 79-0580
Soda, K., 79-0540
Sodergren, A., 79-0488
Soffietti Gennar, M., 79-0213
Sokic, B., 79-0021
Sokolov, M. S., 79-0525
Somers, J. D., 79-0370
Sonnet, P. E., 79-0386, 79-0473
Sonstegard, R. A., 79-0577
Sosinska, G., 79-0724
Sovocool, G. W., 79-0652
Sowa, B. A., 79-0445
Spasovskii, M. Kh., 79-0395
Spiridonova, V. S., 79-0079
Spitzer, P. R., 79-0341
Srinivasan, K., 79-0407
Srivastava, V. M. L., 79-0400
Staffeldt, E. F., 79-0673
Staiff, D. C., 79-0266
Stalberg, E., 79-0602
Stancioiu, N., 79-0203
Stankevich, P. B., 79-0662
Stanley, P. I., 79-0122
Stark, R., 79-0270
Starvou, A., 79-0600
Steele, L. A., 79-0286
Stefan, A., 79-0203
Stein, V. B., 79-0152
Steiner, H., 79-0014
Steinwandter, H., 79-0115, 79-0639
Stevens, C., 79-0362
Stevens, F., 79-0508
Stevens, T. S., 79-0490
Stollman, J., 79-0506
Stonefield, K. I., 79-0062
Stowe, C. M., 79-0336
Stratman, F. W., 79-0151
Street, J. C., 79-0188
Strekozov, B. P., 79-0525
Strik, J. J. T. W. A., 79-0087
Strobel-Kaminska, T., 79-0366
Stucker, R. E., 79-0297
Subrahmanyam, D., 79-0614
Subramaniam, T. R., 79-0296
Sud, S. C., 79-0409
Suess, A., 79-0065
Sugaya, H., 79-0544, 79-0591, 79-0592
Suggs, J. E., 79-0704
Sukhoparova, V. P., 79-0535
Sulinski, A., 79-0367
Sumino, K., 79-0539
Sundlof, S. M., 79-0414
Sundwall, A., 79-0621
Supak, J. R., 79-0059
Suta, V., 79-0262
Sutherland, D. J., 79-0586
Sutherland, M. L., 79-0232
Suvorov, A. P., 79-0080
Suzuki, A., 79-0543, 79-0597, 79-0694 79-0698
Suzuki, H., 79-0436, 79-0594
Suzuki, K., 79-0590
Suzuki, M., 79-0309, 79-0492, 79-0735
Suzuki, T., 79-0222
Suzuki, Y., 79-0434
Swanson, H. R., 79-0670
Swindon, D. M., 79-0122
Swoboda, A. R., 79-0059
Szamenska, T., 79-0104
Tafuri, F., 79-0477
Taguchi, F., 79-0589
Tajima, J., 79-0596
Tajiri, H., 79-0590
Takahashi, K., 79-0431
Takamatsu, Y., 79-0595
Takamiya, T., 79-0545
Takano, A., 79-0542
Takano, S., 79-0590, 79-0594
Takase, I., 79-0292
Takimoto, Y., 79-0436
Takizawa, 79-0255
Tamura, K., 79-0690
Tamura, O., 79-0332
Tan, L. P., 79-0678
Tanaka, A., 79-0222
Tandon, S. K., 79-0387
Taniguchi, K., 79-0690
Taniguchi, Y., 79-0682
Taranova, N. P., 79-0721
Tashiro, H., 79-0516
Taylor, A. W., 79-0045
Teichmann, B., 79-0103
Teleugaliev, T. M., 79-0063
Teramoto, S., 79-0429, 79-0430
Terzic, M. R., 79-0672
Tewari, C. P., 79-0400
Tezuka, H., 79-0429, 79-0430
Thamavit, W., 79-0137
Thiele, E., 79-0094, 79-0345
Thielemann, H., 79-0052, 79-0250
Thigpen, J. E., 79-0612
Thomas, T. C., 79-0742
Thompson, N. P., 79-0026, 79-0299 79-0301, 79-0475
Thompson, W. D., 79-0109
Thymakis, M. K., 79-0576
Tibbitts, F. D., 79-0113
Tjalve, H., 79-0363
Tluczkiewicz, J., 79-0638
Tobin, J. S., 79-0322
Tockman, B. A., 79-0634
Todorova, E. A., 79-0141
Tokunaga, Y., 79-0183, 79-0691 79-0692, 79-0693
Tolle, A., 79-0167
Tonkopii, V. D., 79-0651
Toor, H. S., 79-0636
Torres, L. M., 79-0533
Tos-Luty, S., 79-0635
Touitou, Y., 79-0410
Townsend, L. H., Jr., 79-0469
Townsend, M. G., 79-0108
Trafer, W. F., 79-0422
Triplett, G. B., Jr., 79-0295
Trivett, G., 79-0454
Trondina, G. A., 79-0248
Trotter, W., 79-0227
Truhaut, R., 79-0010
Trump, J. G., 79-0321
Tsubura, Y., 79-0682
Tsuchida, M., 79-0701
Tsugane, S., 79-0589, 79-0596
Tsugane, Y., 79-0596
Tsumura, S., 79-0499
Tsyrkunov, L. P., 79-0334
Tu, C. M., 79-0117
Tucaliuc, M., 79-0262
Tuchmann-Duplessis, H., 79-0073
Turner, C. E., 79-0533
Turner, E. C., Jr., 79-0469
Turner, H., 79-0246
Turner, R. K., 79-0251
Turton, D., 79-0484
Tyburczyk, W., 79-0199
Uchida, A., 79-0545
Uchino, F., 79-0343
Uchiyama, M., 79-0434
Ueda, E., 79-0054
Ueda, K., 79-0696
Ueda, Y., 79-0701
Uerdingen, U., 79-0624
Uga, S., 79-0391
Ulasevich, E. I., 79-0536
Unai, T., 79-0189

Underwood, J. C., 79-0737
Unger, I., 79-0043
Uno, M., 79-0054
Usutani, S., 79-0595
Uziak, S., 79-0709
Valcamonica, C., 79-0702
Valiela, I., 79-0579
Van Cauwenberge, P., 79-0748
Van Esch, G. J., 79-0464
Van Gelder, G. A., 79-0420
Van Hiel, K., 79-0225
van Logten, M. J., 79-0170
Van Miller, J. P., 79-0178
Van Peteghem, C., 79-0741
Van Peteghem, C. H., 79-0493
Van Renterghem, R., 79-0046
Vasic, B. V., 79-0672
Vasil'eva, G. K., 79-0534
Vasilos, A. F., 79-0141
Vaughn, W. K., 79-0329, 79-0456
Vea, E. V., 79-0658
Velcich, A., 79-0730
Venkateswarlu, K., 79-0035
Venkitasubramanian, T. A., 79-0123
Verhoef, C. H., 79-0464
Verma, S. R., 79-0096, 79-0346 79-0357, 79-0714
Versan, L. V., 79-0396
Verschoyle, R. D., 79-0362
Veselovs'kii, I. V., 79-0536
Vickery, L., 79-0062
Viladiu, P., 79-0710
Villeneuve, D. C., 79-0649
Viswanathan, R., 79-0040
Vitvitskaya, B. R., 79-0668
Viviani, A., 79-0629
Vogel, R. S., 79-0414
von Stryk, F. G., 79-0041, 79-0271
Von Woert, M. H., 79-0689
Vonk, J. W., 79-0432
Voronina, V. H., 79-0102
Vos, J. G., 79-0170
Vouk, V. B., 79-0504
Vsevolozhskaya, N. B., 79-0534
Vulto, T. J. A., 79-0464
Wagenet, R. J., 79-0308
Wahid, P. A., 79-0057
Wakatsuki, S., 79-0591, 79-0592
Wakisaka, I., 79-0541, 79-0542
Walcyzna, K., 79-0104
Walker, A., 79-0510, 79-0564, 79-0565
Walker, C. H., 79-0705
Walker, G., 79-0019
Walker, J. R. L., 79-0669
Walker, N., 79-0161
Walker, W., II, 79-0341
Walter-Echols, G., 79-0037
Ward, C. T., 79-0264
Ward, J. M., 79-0674
Ware, G. W., 79-0269, 79-0551
Warnes, D. D., 79-0297
Warren, R. J., 79-0462
Wassermann, D., 79-0514
Wassermann, M., 79-0514
Watabe, K., 79-0544
Watabe, M., 79-0540
Watanabe, A., 79-0222
Watanabe, S., 79-0245
Watanabe, T., 79-0492, 79-0499
Watkins, D. A. M., 79-0051
Wauchope, R. D., 79-0530
Weaver, B. M. Q., 79-0335
Webster, G. R. B., 79-0268
Wedberg, J. L., 79-0546
Wegman, R. C. C., 79-0464
Weigert, P., 79-0064
Weiss, A. H., 79-0314
Wenzel, E., 79-0368
Werner, D., 79-0371
Werner, E., 79-0094
West, P. R., 79-0022
Westlake, G. E., 79-0122
Whalen, C., 79-0454
Wheeler, W. B., 79-0475, 79-0532
Wheelock, J. V., 79-0281, 79-0282 79-0283
Widdop, B., 79-0340
Wien, R. G., 79-0670
Wigowska-Sowinska, J., 79-0663
Wilkinson, R. R., 79-0316
Williams, I. H., 79-0039
Willis, G. H., 79-0058, 79-0480
Wilson, B. W., 79-0677
Wilson, G. I., 79-0419
Wilson, W. W., 79-0259
Wiltrout, R. W., 79-0372
Winell, B., 79-0305
Wing, K. D., 79-0412
Wingfield, E. S., 79-0246
Wingfield, S. E., 79-0450
Winkelsberg, G., 79-0352
Winston, J. M., 79-0717
Winterlin, W., 79-0019
Winterlin, W. L., 79-0520, 79-0675
Witkonton, S., 79-0301
Wolfe, H. R., 79-0266
Wolfe, N. L., 79-0306, 79-0307
Wood, F. A., 79-0270
Woodrow, J. E., 79-0528
Woods, J. S. , 79-0425
Wright, D., 79-0229
Wright, F. C., 79-0233
Wright, K. A., 79-0321
Wright, N., 79-0072
Wu, A., 79-0491
Wustner, D. A., 79-0412
Wycoff, D., 79-0110
Yadav, D. V., 79-0647
Yagminas, A. P., 79-0649
Yakubovskaya, T. Yu., 79-0080
Yakushenko, V. E., 79-0396
Yamagishi, M., 79-0590, 79-0594
Yamaguchi, I., 79-0438
Yamamoto, I., 79-0437
Yamamoto, T., 79-0183
Yamatake, S., 79-0540
Yamato, Y., 79-0309, 79-0492, 79-0735
Yanagasawa, T., 79-0589
Yanagisawa, F., 79-0701
Yanai-Inbar, I., 79-0580
Yang, K. H., 79-0453
Yang, M. S., 79-0308
Yang, R. S. H., 79-0152
Yarbrough, J. D., 79-0187
Yariv, S., 79-0304
Yaron, B., 79-0055
Yatomi, T., 79-0696
Yeoman, W. B., 79-0072
Yokota, T., 79-0343
Yokoyama, T., 79-0589, 79-0596
Yoshida, A., 79-0703
Yoshida, K., 79-0284
Yoshida, T., 79-0434, 79-0719
Yosim, S. J., 79-0320
Youness, E., 79-0327
Young, D. R., 79-0571
Yuen, S. H., 79-0221
Zabib, M. E., 79-0557
Zaffaroni, N. P., 79-0119
Zalewska, Z., 79-0368
Zapryanov, Z., 79-0659
Zasadowski, A., 79-0365
Zavala, D. C., 79-0110, 79-0656
Zavanella, T., 79-0119
Zawadzka, T., 79-0449
Zelger, J., 79-0609
Zell, M., 79-0275
Zepp, R. G., 79-0306, 79-0307
Zerba, E., 79-0413
Zilkey, B., 79-0062
Ziskover, R., 79-0467
Zolotnikova, G. P., 79-0140
Zotove, V. M., 79-0140
Zweig, G., 79-0229

CORPORATE AUTHOR INDEX

NCI, 79-0169, 79-0685, 79-0686, 79-0687
NRC, 79-0745

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